

## About the Cover Photographs

### Front cover:

The nation's first zero-waste initiative at a Bowl Championship Series football stadium began at CU-Boulder in 2008 with a recycling and composting program dubbed Ralphie's Green Stampede. That first year shattered all previous home football game recycling records, drastically cut CU's environmental footprint for sporting events, and built upon the university's longstanding tradition of leadership in climate research, energy innovation, and campus sustainability.

### Back cover:

*Left*, Sophia B. Liu, a student in the Technology, Media, and Society PhD program, sits near an area burned in a 2009 brush fire in north Boulder. Liu studied firsthand how social media can be used to disseminate information during an environmental crisis.

*Right*, Villagers in Muramba, Rwanda, have an effective, easy-to-use water purification system that can deliver clean drinking water to the entire community, thanks to an Engineers Without Borders team project from the University of Colorado. (Photograph courtesy of CU-Boulder Engineers Without Borders)

## Academic Calendar

The campus operates year round on a semester system, with fall and spring semesters of 16 weeks each, a 10-week summer session, and a three-week "Maymester" academic period between spring semester and summer session.

### Summer Session 2010

April 1 (Thurs.) . . . . .	Transfer application deadline for summer and fall sessions
May 10 (Mon.) . . . . .	Maymester begins
May 27 (Thurs.) . . . . .	Final exams for Maymester
May 31 (Mon.) . . . . .	Memorial Day holiday; campus closed
June 1 (Tues.) . . . . .	Classes begin for terms A, C, and D; 7:30 a.m.
July 2 (Fri.) . . . . .	Final examinations for term A (first five-week term)
July 5 (Mon.) . . . . .	Independence Day holiday; campus closed
July 6 (Tues.) . . . . .	Classes begin for term B (second five-week term)
July 23 (Fri.) . . . . .	Final examinations for term C (eight-week term)
Aug. 6 (Fri.) . . . . .	Final examinations for terms B and D (second five-week and 10-week terms)
Aug. 7 (Sat.) . . . . .	Official graduation date. No summer ceremony.

### Fall Semester 2010

Aug. 23 (Mon.) . . . . .	Classes begin; 8:00 a.m.
Sept. 6 (Mon.) . . . . .	Labor Day holiday; campus closed
Oct. 1 (Fri.) . . . . .	Freshman and transfer application deadline for spring semester
Oct. 15–17 (Fri.–Sun.) . . . . .	Family Weekend
Nov. 22–24 (Mon.–Wed.) . . . . .	Fall break; no classes
Nov. 25–26 (Thurs.–Fri.) . . . . .	Thanksgiving holiday; campus closed
Dec. 1 (Weds.) . . . . .	Freshman non-binding early notification deadline for fall and summer sessions
Dec. 10 (Fri.) . . . . .	Last day of classes
Dec. 11–16 (Sat.–Thurs.) . . . . .	Final examinations
Dec. 17 (Fri.) . . . . .	Commencement

### Spring Semester 2011

Jan. 10 (Mon.) . . . . .	Classes begin; 8:00 a.m.
Jan. 15 (Fri.) . . . . .	Freshman application deadline for summer and fall sessions
Jan. 17 (Mon.) . . . . .	Martin Luther King Jr. holiday; campus closed
Mar. 21–25 (Mon.–Fri.) . . . . .	Spring break
April 1 (Fri.) . . . . .	Transfer application deadline for fall and summer sessions
April 29 (Fri.) . . . . .	Last day of classes
April 30–May 5 (Sat.–Thurs.) . . . . .	Final examinations
May 6 (Fri.) . . . . .	Commencement

### Summer Session 2011

May 9 (Mon.) . . . . .	Maymester begins
May 26 (Thurs.) . . . . .	Final exams for Maymester
May 30 (Mon.) . . . . .	Memorial Day holiday; campus closed
May 31 (Tues.) . . . . .	Classes begin for terms A, C, and D; 7:30 A.M.
July 1 (Fri.) . . . . .	Final examinations for term A (first five-week term)
July 4 (Mon.) . . . . .	Independence Day holiday; campus closed
July 5 (Tues.) . . . . .	Classes begin for term B (second five-week term)
July 22 (Fri.) . . . . .	Final examinations for term C (eight-week term)
Aug. 5 (Fri.) . . . . .	Final examinations for terms B and D (second five-week and 10-week terms)
Aug. 6 (Sat.) . . . . .	Official graduation date. No summer ceremony.

The university's calendar committee requests that make-up time be provided to students absent for religious reasons.

# University of Colorado at Boulder Catalog 2010–11



## Redefining Our Impact on the Earth

### **Weaving Sustainability into a Broad Range of Curricula**

CU-Boulder offers 14 degree programs, nine majors, and four certificate programs in or related to environmental studies. Environmental course work is offered by the College of Architecture and Planning, College of Arts and Sciences, Leeds School of Business, College of Engineering and Applied Science, School of Journalism and Mass Communication, and Law School.

*Above: Students in Sustainability and the Built Environment (CVEN 4700/5700) learn straw bale construction at the Field Lab for Applied Sustainable Technologies.*

## The Catalog

The 2010–11 *University of Colorado at Boulder Catalog* contains a summary of campus facilities, programs, and services; descriptions of colleges, schools, and individual departments; and degree requirements, course descriptions, and faculty listings as of December 2009. Students should refer to the degree, major, and certification requirements listed at the time they formally enter a program. For additional information, students should consult their dean’s office.

Because the catalog is compiled well in advance of the academic year it covers, changes in programs, policies, and the academic calendar may occur. Up-to-date information may be obtained by consulting departmental advisors, checking departmental bulletin boards, visiting the online Schedule Planner ([plus.colorado.edu/plus/planner](http://plus.colorado.edu/plus/planner)) and the catalog website ([www.colorado.edu/catalog](http://www.colorado.edu/catalog)), and reviewing registration materials distributed each semester.

All catalog information is subject to change without notice or obligation.

Additional catalogs may be purchased for \$7.50 (plus shipping and handling) through the CU Book Store, phone 303-492-6411 or 1-800-255-9168 or visit [www.cubookstore.com](http://www.cubookstore.com).

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UNIVERSITY OF COLORADO AT BOULDER  
University Communications

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*Design and production:* Polly Christensen

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## Statement on Diversity

At the University of Colorado at Boulder we are committed to building a campus community in which diversity is a fundamental value. People are different and the differences among us are what we call diversity—a natural and enriching hallmark of life. Diversity includes, but is not limited to, ethnicity, race, gender, age, class, sexual orientation, religion, disability, political viewpoints, veteran status, gender identity/expression, and health status. A climate of healthy diversity is one in which people value individual and group differences, respect the perspectives of others, and communicate openly.

Diversity is a key to inclusive excellence in education. A diverse learning environment better prepares all students for the world that awaits them. CU-Boulder is committed to enriching the lives of our students, faculty, and staff by providing a diverse campus where the exchange of ideas, knowledge, and perspectives is an active part of learning.

—from the *Guidelines for Diversity Planning*

The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities.

CU-Boulder takes action to increase ethnic, cultural, and gender diversity, to employ qualified disabled individuals, and to provide equal opportunity to all students and employees.

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\*Additional information on the Environmental Claims Paper Challenge

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# Welcome from the Chancellor

## Board of Regents

STEVE BOSLEY, Chair  
At Large; term expires January 2011

TILLMAN "TILLIE" BISHOP, Vice Chair  
District 3; term expires January 2013

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## Administrative Officers

### CU System

BRUCE BENSON  
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KELLY FOX  
Vice president and chief financial officer. BA,  
University of Nebraska; MA, University of Colorado Denver.

DANIEL J. WILKERSON  
Vice president, university counsel, and secretary to the Board of Regents. BA, Cornell University; JD, Willamette University.

### CU-Boulder

PHILIP P. DISTEFANO  
Chancellor; professor of education. BS, PhD, Ohio State University; MA, West Virginia University.

STEIN STURE  
Interim provost and executive vice chancellor for academic affairs. BS, MS, PhD, University of Colorado at Boulder.

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RUSSELL L. MOORE  
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RIC PORRECA  
Senior vice chancellor and chief financial officer. BA, North Adams State College.

JULIE WONG  
Vice chancellor for student affairs. BA, San Jose State University; MA, Michigan State University; PhD, University of Southern California.



THANK YOU FOR YOUR INTEREST in the University of Colorado at Boulder, and to those of you who will be attending CU this year, welcome to our university community!

When I think about CU-Boulder and our passion for having a positive impact on the Earth, I'm reminded of a quote from the communicator Marshall McLuhan that says, "There are no passengers on spaceship earth. We are all crew."

For more than half a century, the crew that is CU-Boulder has been a leader in world-class climate and energy research, environmental studies, the integration of environmental course work into a variety of fields and degrees, and aggressive plans for campus sustainability. From classrooms to research centers, event facilities, residence halls, and the community, decades of CU-Boulder students, faculty, staff, and administrators have carried on a commitment to knowledge, innovation, solutions, and everyday actions for environmental stewardship.

I know that you too are looking with eagerness to the future and to your role in making our "global village" (another saying from McLuhan) a better place, and it is with great pride that I welcome you to CU and invite you to share in our vision!

Sincerely,

PHILIP P. DISTEFANO  
Chancellor, University of Colorado at Boulder

*Chancellor DiStefano plugs his electric hybrid vehicle into the garage of the chancellor's residence to demonstrate the interface with Xcel Energy's SmartGrid program.*

# Redefining Our Impact on the Earth

late '70s



## Pioneering Campus Conservation

Our leadership in sustainability dates back more than half a century and includes the nation's first student-led environmental center (1970), the first collegiate recycling program (1976), and the first student-funded wind energy purchase for campus buildings (2000).

## Making the Grade in Sustainability

Often singled out for sustainability awards, CU-Boulder was named the 2009 top "green" university in the nation by *Sierra* magazine. We also received a grade of A- on the Sustainable Endowment Institute's 2009 College Sustainability Report Card.



2009

## Putting CU's Commitment in Writing

By embracing Colorado's "Greening of State Government" executive orders in 2007, CU-Boulder promised to meet very specific goals and timelines for energy conservation and greenhouse gas reduction.

At the national level, last year the university filed its carbon neutrality plan with the American College and University Presidents' Climate Commitment, again making public our plans to reduce energy consumption and greenhouse gas emissions.

# Redefining Our Impact on the Earth



## **Researching Climate Change**

From the Arctic to Antarctica (*above*) and Costa Rica to Colorado, hundreds of researchers and students from CU-Boulder departments, centers, and institutes are chronicling environmental changes to better understand the impacts of both natural and human-caused climate warming.

## **Living the Sustainability Experience**

Students in the Baker Residential Academic Program (RAP) enjoy a shared living experience with a conservation-minded community. The Baker program offers lectures, field trips, and research opportunities to first- and second-year students interested in natural or environmental sciences.

## **Creating a Zero-waste Football Season**

The nation's first zero-waste program at a Bowl Championship Series football stadium, dubbed Ralphie's Green Stampede, began here in 2008.

# Redefining Our Impact on the Earth



## **Fostering Student Initiatives**

Students are at the forefront of our environmental successes. For example, each year since 2005 the student-led and student-funded Sustainable CU Referendum has dedicated money to implement on-campus projects incorporating renewable energy, energy efficiency, and recycling and waste reduction. Particular attention is paid to initiatives created and led by students, thereby enhancing student opportunities.

## **Collaborating to Promote Energy Research**

The Renewable and Sustainable Energy Institute, an interdisciplinary joint research effort with the National Renewable Energy Laboratory (NREL), was formed in 2009 to advance solutions for producing energy economically from low-carbon sources, decreasing reliance on foreign oil, reducing greenhouse gas emissions, and using energy more efficiently.

CU-Boulder is also a founding member of the Colorado Renewable Energy Collaboratory (with Colorado State University, the Colorado School of Mines, and NREL), formed to create renewable energy technologies and to generate educational opportunities and economic growth in Colorado.

*Left: Dan Johnson demonstrates his solar energy tracker prototype for the CU-Boulder Energy Initiative (now the Renewable and Sustainable Energy Institute).*



# Redefining Our Impact on the Earth



## Studying and Living in a Green Environment

Four campus buildings have been awarded gold-level Leadership in Energy and Environmental Design (LEED) certification for their aggressive green building standards—Wolf Law (*top left*), Koelbel Business (*top right*), ATLAS (*bottom left*), and Arnett Hall (*bottom right*). We are currently working toward certification for nine more buildings. LEED certification is a national standard issued by the United States Green Building Council.

## Offering Graduate Degrees in Environmental Studies

Interdisciplinary graduate degrees in environmental studies offer opportunities for education and research at the professional level to address the complex environmental issues facing Colorado, the Rocky Mountain West, and the global community. Students may earn MS or PhD degrees from the College of Engineering and Applied Science or dual degrees with the Leeds School of Business (MS/MBA) or the Law School (MS or PhD/JD).



**A**T ITS FIRST SESSION IN 1861, Colorado's territorial legislature passed an act providing for a university in Boulder. Between 1861 and 1876, Boulder citizens donated land south of town and made gifts from \$15 to \$1,000 to match the \$15,000 the state legislature appropriated for the university's construction. In 1875, Colorado citizens laid the cornerstone for the university's first building, Old Main, and officially founded CU in 1876, the same year Colorado joined the union. The university opened its doors the following year with 44 students, a president, and one instructor.

## The University of Colorado

Today, the University of Colorado is a four-campus system that includes the University of Colorado at Boulder, the University of Colorado at Colorado Springs, the University of Colorado Denver, and the University of Colorado Anschutz Medical Campus. The campuses have a combined enrollment of more than 55,000 students. To meet the needs of its students, the university system offers an extensive number of undergraduate, graduate, and professional degree programs, as well as opportunities to study abroad, engage in public service, and conduct research.

CU ranks seventh among public universities and colleges in federal research expenditures and 13th among all universities in federally funded expenditures tracked by the National Science Foundation. Sponsored research within the university system represents annual awards totaling more than \$711 million. Federal agencies are the principal sources of these funds for research and training contracts and grants, but the state of Colorado also provides appropriations for university operations, teaching, and research activities. CU also relies on revenues from tuition and fees, contracts and grants, investments and interest income, health services, and the generous support of private foundations and donors.

An elected nine-member Board of Regents governs CU, and is charged by the state constitution with the general supervision of the university and the exclusive control and direction of all its funds and appropriations, unless otherwise provided by

law. The board conducts its business at regular meetings open to the public and through committees. The president is the chief administrative officer and is responsible for providing leadership to the university. The CU Board of Regents reserves the right to establish enrollment levels for all academic areas.

For more information about the CU Board of Regents, go to [www.cu.edu/regents](http://www.cu.edu/regents); to learn more about the CU system, visit [www.cu.edu](http://www.cu.edu).

## The Boulder Campus

### *Statutory Mission*

CU-Boulder's vision is grounded in its statutory mission as a national public research university. In Colorado statute, the university is defined as the "comprehensive graduate research university with selective admissions standards . . . , offer(ing) a comprehensive array of undergraduate, master, and doctoral degree programs" of what is now designated the University of Colorado System.

CU-Boulder recognizes the exceptional opportunities associated with its role as a research university, and values the unique strength and character research achievements bring to undergraduate education. It is keenly aware of its responsibility for educating the next generation of citizens and leaders, and for fostering the spirit of discovery through research. Indeed, CU-Boulder believes that its students, both graduate and undergraduate, benefit from the comprehensive mix of programs and research excellence that characterize a flagship university. Thus, CU-Boulder's statutory mission is relevant today and will remain relevant tomorrow.

Since 2007, CU-Boulder's strategic plan, *Flagship 2030* ([www.colorado.edu/flagship](http://www.colorado.edu/flagship)), has been guiding near-term actions and investments that will sustain CU's quality and competitiveness and, through visionary "flagship initiatives," will transform the university within the next quarter-century.

### *General Information*

As a comprehensive university, CU-Boulder is committed to the liberal education of students via a broad curriculum ranging from the baccalaureate through the postdoctoral levels.

With an enrollment of more than 30,000 students, the University of Colorado at Boulder is the largest campus in the four-campus system. The student population comes from every state in the nation and from more than 100 foreign countries. Many different ethnic, religious, academic, and social backgrounds are represented, fostering the development of a multicultural academic community that enriches each student's educational experience.

On the Boulder campus, the chancellor is the chief academic and administrative officer and is responsible for conducting campus affairs in accordance with the policies of the Regents, and overseeing the Athletic Department. Faculty participate in campus governance through the Faculty Senate and the Faculty Assembly. Students participate through the University of Colorado Student Union (UCSU) and the United Government of Graduate Students (UGGS).

Full-time instructional faculty members number approximately 1,286, with at least 91 percent holding doctorates or appropriate terminal degrees. The faculty includes nationally and internationally recognized scholars with many academic honors and awards, including several CU-Boulder research faculty from the National Snow and Ice Data Center who shared the 2007 Nobel Peace Prize with former Vice President Al Gore for their contributions to the international report of the Intergovernmental Panel on Climate Change; John Hall, winner of the 2005 Nobel Prize in physics; Carl Wieman and Eric Cornell, winners of the 2001 Nobel Prize in physics; and Tom Cech, winner of the 1989 Nobel Prize in chemistry. Seven faculty have received MacArthur Fellowships, the so-called "genius grant." Twenty active or retired faculty are members of the National Academy of Sciences; 19 are included in the membership of the American Academy of Arts and Sciences; 13 are members of the National Academy of Engineering; and five are members of the National Academy of Education. Most faculty members, including full professors, teach both undergraduate and graduate classes. Faculty members incorporate their research and creative activities directly into instructional programs.

Research conducted at CU-Boulder is supplemented by research institutes devoted both to the advancement of knowledge in particular areas and to graduate training. Many of these institutes have developed international reputations. For a detailed description of research institutes and other important research facilities associated with the university, see the Graduate School section.

To enhance its research capabilities and to provide collaborative opportunities with government and business, CU-Boulder developed a 200-acre research park east of the main campus. The park provides expanded room for research institutes and centers that work closely with university researchers.

The educational environment of a research university is characterized by a broad range of experiences in many different settings. While the classroom is the location for most instructional activities, laboratories, seminars, and field work also are important features of the undergraduate and graduate experience. Some programs encourage off-campus internships and training; study abroad programs also have gained popularity. For students whose interests cross traditional disciplinary lines, a number of interdisciplinary programs are available.

### *The Campus Setting*

CU-Boulder is located at the foot of the Rocky Mountains, at an altitude of 5,400 feet. The Flatirons geologic formation is visible from nearly everywhere on campus. The climate is temperate, with generally pleasant days and cool evenings. On average,

Boulder enjoys about 340 sunny or partly sunny days each year. The main campus covers 600 acres and includes about 200 buildings constructed of rough-cut Colorado sandstone with red tile roofs. The rural Italian (or Tuscan vernacular) architectural style evolved from a master plan developed by Philadelphia architect Charles Klauder in 1919. The Norlin Quadrangle, including the original Old Main building, is listed in the State and *National Register of Historic Places*. The campus has been noted as one of the most aesthetically pleasing in the country.

Boulder County encompasses five ecological zones, from 5,000 feet above sea level (plains grassland) to 14,000 feet (alpine tundra). Downtown Boulder is only 20 miles from the Continental Divide and boasts some of the most spectacular scenery in the United States. The city of Boulder, population 96,000, is committed to preserving its beautiful natural environment and is surrounded by 26,000 acres of open space.

Denver, the state's capital city, is 30 miles from Boulder. Denver offers the attractions and resources of a large metropolitan area and is accessible from Boulder by traveling on U.S. 36, also known as the Denver-Boulder Turnpike. Denver's international airport is served by most major carriers and is located approximately 60 minutes southeast of Boulder. Boulder and the Denver International Airport are connected by a public transportation system.

### *Undergraduate Enrollment and Graduation Rates*

CU-Boulder's fall 2009 entering freshman class numbered 5,519. Of these, 49 percent were females, 59 percent residents of Colorado, and 16 percent members of minority groups (African Americans, Asian Americans, Hispanics, and Native Americans). Seventy-two percent enrolled in the College of Arts and Sciences, 11 percent in the Leeds School of Business, 13 percent in the College of Engineering and Applied Science, and 4 percent, combined, enrolled in the College of Architecture and Planning and the College of Music. About 20 percent of freshmen entering CU-Boulder transfer to another college or school within the university before they graduate.

Of the freshmen entering in summer or fall 2003 who enrolled full time, 41 percent graduated within four years; 63 percent graduated within five years; and 67 percent graduated within six years. Of the students who entered in fall 2008, 83 percent returned for their second fall semester.

### *CU-Boulder Academic Programs*

The Boulder campus offers more than 3,400 different courses in approximately 150 fields of study. These courses represent a full range of disciplines in the humanities, the social sciences, the physical and biological sciences, the fine and performing arts, and the professions. CU-Boulder is accredited by the Higher Learning Commission and a member of the North Central Association ([www.ncahigherlearningcommission.org](http://www.ncahigherlearningcommission.org); 312-263-0456). (See individual colleges and schools for additional accreditation information.)

For information on the content of academic programs and official degree designations, refer to the appropriate catalog sections. Additional graduate and professional programs are located on other campuses of the university; see the Graduate School section.

### *Colorado Springs Campus*

The University of Colorado at Colorado Springs, located on Austin Bluffs Parkway in Colorado Springs, is one of the fastest growing universities in the nation. The university offers 30 bachelor's, 19 master's, and five doctoral degrees. The campus enrolls about 8,000 students annually.

**Degree Programs**

B = Bachelor's Degree  
 JD = Juris Doctor  
 C = Certificate  
 M = Master's Degree  
 (M) = Master's Degree offered as part of the PhD program only  
 D = Doctoral Degree

**College of Architecture and Planning**

Environmental Design	B		
College of Arts and Sciences			
Anthropology	B	M	D
Applied Mathematics		M	D
Art History	B	M	
Asian Languages and Civilizations		M	
Asian Studies	B		
Astronomy	B		
Astrophysical and Planetary Sciences		M	D
Atmospheric and Oceanic Sciences		M	D
Audiology			D
Biochemistry	B	(M)	D
Chemical Physics			D
Chemistry	B	(M)	D
Chinese	B		
Classics	B	M	D
Communication	B	M	D
Comparative Literature		M	D
Creative Writing		M	
Dance	B	M	
Distributed Studies	B		
Ecology and Evolutionary Biology	B	M	D
Economics	B	(M)	D
English	B	M	D
Environmental Studies	B	M	D
Ethnic Studies	B		
Film Studies	B		
French	B	M	D

Geography	B	M	D
Geology	B	M	D
Geophysics			D
German		M	
Germanic Studies	B		
History	B	M	D
Humanities	B		
Integrative Physiology	B	M	D
International Affairs	B		
Italian	B		
Japanese	B		
Linguistics	B	M	D
Mathematics	B	M	D
Molecular, Cellular, and Developmental Biology	B	(M)	D
Philosophy	B	M	D
Physics	B	M	D
Political Science	B	M	D
Psychology and Neuroscience	B	(M)	D
Religious Studies	B	M	
Russian Studies	B		
Sociology	B	(M)	D
Spanish	B	M	D
Speech, Language, and Hearing Sciences	B	M	D
Studio Arts	B	M	
Theatre	B	M	D
Women's Studies	B		

**Leeds School of Business**

Business Administration	B	M	D
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**School of Education**

Curriculum and Instruction		M	D
Education		C	
Educational/Psychological Studies		M	D
Research and Evaluation Methodology			D
Social, Multicultural, and Bilingual Foundations		M	D

**College of Engineering and Applied Science**

Aerospace Engineering Sciences	B	M	D
Applied Mathematics	B		
Architectural Engineering	B		
Chemical and Biological Engineering	B		
Chemical Engineering	B	M	D
Civil Engineering	B	M	D
Computer Science	B	M	D
Electrical and Computer Engineering	B		
Electrical Engineering	B	M	D
Engineering Management			M
Engineering Physics	B		
Environmental Engineering	B		
Mechanical Engineering	B	M	D
Telecommunications			M

**Graduate School**

Cognitive Science			D
Museum and Field Studies		M	
Neuroscience			D
Technology, Media, and Society			D

**School of Journalism and Mass Communication**

Journalism and Mass Communication		B	M	D
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**Law School**

Law				JD
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**College of Music**

Arts in Music	B		
Music	B	M	D
Music Education	B	M	
Musical Arts			D

**Academic Programs**

College of Business and Administration  
 College of Education  
 College of Engineering and Applied Science  
 Graduate School  
 College of Letters, Arts, and Sciences  
 Beth-El College of Nursing and Health Sciences  
 School of Public Affairs

**University of Colorado Denver**

More than 30,000 students take classes each year at the Downtown Campus, at the Anschutz Medical Campus in Aurora, in centers and institutes across the state, and online. They study in more than 115 degree programs through 13 schools and colleges.

The university awards more than 4,000 degrees each year and has more graduate programs than any other institution in the state. More than \$371 million in sponsored research awards came to UC Denver in 2007-08.

**Downtown Campus**

Near the heart of downtown, the campus is conveniently located on the Auraria Campus with easy access to Denver's com-

mercial and governmental hubs. Schools and colleges on this campus include:

College of Architecture and Planning  
 College of Arts & Media  
 Business School  
 School of Education & Human Development  
 College of Engineering and Applied Science  
 College of Liberal Arts and Sciences  
 School of Public Affairs

**Anschutz Medical Campus**

The Anschutz Medical Campus in Aurora delivers a broad network of health care programs. In addition to University of Colorado Hospital, a number of renowned institutes are affiliated with the campus. The Anschutz Medical Campus presents state-of-the-art education and research facilities with an adjoining biomedical park. Schools and colleges on this campus include:

School of Dental Medicine  
 School of Medicine  
 College of Nursing  
 School of Pharmacy  
 Colorado School of Public Health  
 Graduate School

## Academic Affairs

### Academic Advising

Academic advising is an integral part of a college education. Its goal is to assist students in making responsible decisions as they develop educational plans compatible with their potential career and life goals. Advising is more than offering information about academic courses and programs; it also involves encouraging students to formulate important questions about the nature and direction of their education and working with them to find answers to these questions.

#### *Responsibilities of Students and Advisors*

Within the advising system on the Boulder campus, both students and advisors have responsibilities.

Students are responsible for:

- attending a special orientation, advising, and registration program on campus before enrolling in their first semester;
- knowing the requirements of their particular academic program, selecting courses that meet those requirements in an appropriate time frame, and monitoring their progress toward graduation;
- consulting with their academic advisor several times every term;
- scheduling and keeping academic advising appointments in a timely manner throughout their academic career, so as to avoid seeking advising only during busy registration periods; and
- being prepared for advising sessions (for example, by bringing in a list of questions or concerns, having a tentative schedule in mind, and/or being prepared to discuss interests and goals with their advisor).

Academic advisors are responsible for:

- helping students clarify their values, goals, and abilities;
- helping students understand the nature and purpose of a college education;
- providing accurate information about educational options, requirements, policies, and procedures;
- helping students plan educational programs consistent with the requirements of their degree program and with their goals, interests, and abilities;
- assisting students in monitoring and evaluating their educational progress; and
- helping students locate and integrate the many resources of the university to meet their unique educational needs and aspirations.

**NOTE:** The university cannot assume responsibility for problems resulting from students failing to follow the policies stated in this catalog or from incorrect advice given by someone other than an appropriate staff member of the college.

#### *Academic Advising Center*

The Academic Advising Center coordinates academic advising, transfer credit evaluation, and graduation certification for all undergraduate students pursuing a program of study in the College of Arts and Sciences and for all open option students. All students in the college are assigned to a primary academic advisor in their major field of study. Students are expected to meet with their assigned advisor on a regular basis throughout the academic year.

The advising center also oversees the Preprofessional Advising Center, which provides advising to all students on the Boulder campus who are intending to pursue law or one of the health professions (dentistry, medicine, nursing, pharmacy, physical therapy, etc.).

In addition, through the open option advising program, the advising center provides comprehensive advising services to students who are undecided about their major, or who are considering changing their major. Open option primary advisors are familiar with the courses and degree requirements for all majors offered at CU-Boulder, and assist open option students in exploring majors related to their interests, aptitudes, and goals. Open option advisors also assist students in designing programs of study that meet graduation requirements while providing students with the academic flexibility to pursue whichever degree program they ultimately choose.

Open option or preprofessional students with general advising questions should visit the Academic Advising Center website at [advising.colorado.edu](http://advising.colorado.edu) to schedule an appointment with their advisor.

### Orientation

The CU-Boulder orientation programs are designed to create a smooth transition to the university community for students and their parents. New freshman and transfer students are required to attend orientation in order to be eligible to register.

A single orientation program for new spring semester students and their parents occurs during the week before classes begin in January.

All new fall students are expected to attend their college orientation program, the chancellor's convocation, and New Student Welcome prior to their first day of class. Detailed information regarding the steps of the orientation process is sent by e-mail or, in some cases, postal mail once students have confirmed their intent to enroll at the university. More information regarding orientation is available at [www.colorado.edu/orientation](http://www.colorado.edu/orientation).

### Summer Session

Summer Session at CU-Boulder, an integral part of the university's year-round program, offers students opportunities for study, individual development, and recreational activity. Summer students can choose from more than 500 courses, allowing progress toward a degree in most areas of study.

Summer Session begins with Maymester, an intensive three-week term offered immediately after spring semester ends. Courses are also offered in one-to-four, five-, eight-, and ten-week formats.

Complementing Summer Session offerings, a rich calendar of summer events includes performances in repertory by members of the Colorado Shakespeare Festival, musical productions presented by the CU Summer Opera company, and performances by members of the Colorado Music Festival. Organized recreational activities are offered through the Student Recreation Center.

The summer catalog is usually available by mid-January. To request a catalog, call **303-492-5148** (toll free **1-800-331-2801**), go to [www.colorado.edu/summer](http://www.colorado.edu/summer), or write Summer Session, University of Colorado at Boulder, 178 UCB, Boulder, CO 80309-0178.

## Student Affairs

### Overview

The Division of Student Affairs focuses on creating a positive learning environment that fosters successful personal develop-

ment and learning both in and outside the classroom. Student learning and success are enhanced when the learning environment and community support students' full development as people, not isolated intellectuals, and when students are seen as important partners in the learning experience.

## Student Learning Environment

A spectrum of uniquely designed services and support programs is available to undergraduate and graduate students as members of the university community. These programs support student development and academic achievement, and they contribute to creating a positive learning environment. Examples include housing, recreation, health care and education, personal and career counseling, and opportunities to develop leadership skills. Personal consultation regarding learning styles and academic performance is also available in many departments. Student Affairs works in a liaison relationship with the University of Colorado Student Union, the Greek system, the Alumni Association, and the CU Parents Association. The division takes an active leadership role in supporting diversity on campus and in building a supportive and respectful campus learning environment. The campus and Student Affairs staffs are proud of the high ratings that students give to many services. The division continues its commitment to improving service delivery in all areas. Approximately 900 professional and highly skilled Student Affairs staff and faculty are responsible for the many programs and services available to all students during their educational careers.

## Undergraduate Admission

The Office of Admissions welcomes inquiries from prospective students regarding undergraduate admission. Through the admission process, the university seeks to identify applicants who will successfully complete a collegiate academic program. Admission is based on many criteria, including high school GPA or GED test scores, high school rank, the quality of course work, college entrance test scores, personal essays, and the extent to which the minimum academic preparation standards (MAPS) have been met.

Inquiries relating to undergraduate admission to the University of Colorado at Boulder may be addressed to:

Office of Admissions  
Regent Administrative Center 125  
University of Colorado at Boulder  
552 UCB  
Boulder, CO 80309-0552  
303-492-6301  
TTY 303-492-5998 (for hard of hearing persons)

To find admission information online, go to [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

For admission requirements to graduate degree programs, see the Graduate School section and individual college and school sections.

## Visiting the Campus

Prospective students and their families are welcome to visit the Office of Admissions in Regent Administrative Center 125 between 9:00 A.M. and 5:00 P.M. (summer hours are 8:30 A.M. to 4:30 P.M.), Monday through Friday, except on holidays. Daily information sessions, walking tours of the campus, and special all-day visit programs are offered. Although interviews are not used in the decision-making process, you are invited to visit the campus.

The best time to see the campus is when classes are in session (September through mid-December and mid-January to early May, with the exception of spring break). An Academic Calendar is printed on the inside front cover of this catalog. There are dates when information sessions, campus tours, and visit programs are not held due to holidays or university closures. It is important to check our website for the most current information.

## Reservations

Reservations are required for all information sessions, tours, and visit programs. For complete visit program descriptions, dates, reservation forms, and campus maps, go to [www.colorado.edu/visit](http://www.colorado.edu/visit), or call 303-492-6301. Visit program dates for future academic years are added to the website as they become available (usually in August each year).

## Daily Information Sessions and Campus Tours

Information sessions with an admission counselor are held Monday through Friday at 9:30 A.M. and 1:30 P.M. Following the information sessions, walking tours of the campus, led by student guides, begin at 10:30 A.M. and 2:30 P.M. Combined information sessions and tours are also held at 10:30 A.M. most Saturdays.

Information sessions are offered at the University Club unless otherwise noted. Parking is available at Euclid AutoPark. Limited metered parking is also available on campus and city streets.

## Campus Visit Programs

An excellent way to become acquainted with the campus is to participate in one of the campus visit programs specially designed for prospective students and parents.

These programs, offered on selected Fridays and Saturdays throughout the year, provide prospective students and their families the chance to participate in information sessions, take a campus tour, learn more about residence hall life, talk with student and parent panels, and meet with campus representatives, as well as attend classes or listen to a sample lecture. To make reservations for any or all of these visit programs, go to [www.colorado.edu/visit](http://www.colorado.edu/visit) or call the Office of Admissions at 303-492-6301.

## General Admission Information

### CU-Boulder's Colleges and Schools

As undergraduates at CU-Boulder, students can choose from among the university's four colleges (architecture and planning, arts and sciences, engineering and applied science, and music) and three schools (business, education, and journalism and mass communication). Undergraduate majors offered at CU-Boulder are listed throughout this catalog.

### Choosing a Program of Study

When applying for admission, students need to choose a major in one of CU-Boulder's colleges or schools. Applicants who have not decided on a major can select an "open option" major. This allows students to explore different options during their first and/or second year of study. After this time, they will decide on a specific major for their remaining years. Students can also change their area of study, but this can result in additional course requirements that may add to the number of semesters necessary to complete a degree.

Although applicants can apply to only one CU-Boulder college or school, after enrollment they can apply for transfer to another Boulder college or school through the Intrauniversity Transfer (IUT) process. Criteria for transferring from one col-

lege or school to another are competitive, and each college or school establishes its own standards.

### *Double Degrees, Double Majors, Minors, and Certificate Programs*

There are several programs that allow students to include additional areas of academic concentration beyond their chosen major. Two different degrees, either from the same college or school, or degrees from different colleges or schools, may be earned, providing certain conditions are met. Students are admitted to one major and degree program initially but may pursue a second degree during their first semester of enrollment. Minor programs are offered in a number of undergraduate departments and programs in the College of Arts and Sciences, the Leeds School of Business, and the College of Engineering and Applied Science. Certificate programs in arts and sciences, business, engineering, and music fields are also available.

### *Preprofessional Study*

Preprofessional advisors are available to help students interested in medicine, dentistry, physical therapy, veterinary medicine, nursing, pharmacy, physician assistant, other allied health sciences, or law. Students interested in these fields may apply to any of the majors open to new undergraduates, including the open option major in the College of Arts and Sciences. Students interested in one of the undergraduate or graduate health sciences programs offered at the University of Colorado Denver may complete preprofessional work on the Boulder campus. Admission is competitive, but preference to all health sciences programs is given to Colorado residents.

For more information, visit [www.colorado.edu/aac](http://www.colorado.edu/aac) or see Preprofessional Programs in the Other Academic Programs section.

### *Music Applicants*

Prospective music majors must submit both an Undergraduate Application for Admission to the Office of Admissions, and a College of Music Admission Application.

All music applicants are initially considered for admission to the College of Arts and Sciences open option major. Admission to a College of Music degree program (bachelor of arts in music, bachelor of music education, bachelor of music) is determined after the music audition and application evaluation process has been completed. Students who are admitted to the College of Arts and Sciences but not the College of Music will be able to keep their place in the College of Arts and Sciences.

Live auditions, which are preferred unless travel distance is prohibitive, are scheduled for selected Saturdays in January and February. Other live audition times may be arranged; high quality recordings also may be submitted in lieu of a live audition.

College of Music scholarships are awarded to music majors only. High school and college transfer students are automatically considered for merit-based music scholarships upon completion of the application process, including the audition. Transfer students who are receiving a scholarship from their current institution must submit a scholarship release form before they can be awarded a music scholarship. To be assured of full consideration for scholarship awards, the audition should be completed by February 15.

The College of Music Admission Application Form, as well as more detailed information about audition requirements, faculty, and degree programs, may be found at [www.colorado.edu/music](http://www.colorado.edu/music).

### *Teacher Education Applicants*

Through the School of Education, students interested in elementary or secondary school teaching may take programs approved for Colorado licensure in connection with Colorado Commission on Higher Education (CCHE) approved majors offered at CU-Boulder.

Elementary teacher education includes kindergarten through sixth grade licensure. Secondary teacher education includes seventh through 12th grades with licensure in English, mathematics, science, social studies, and the following foreign languages: French, German, Italian, Japanese, Latin, Russian, and Spanish. Teacher education programs are also available in music education for kindergarten through 12th grade.

Teacher education program applicants who have completed a four-year undergraduate degree program should apply directly to the School of Education. Those who have not received a bachelor's degree must apply to another CU-Boulder undergraduate degree program and submit their application and credentials to the Office of Admissions. Undergraduate students who plan to pursue teacher education should declare this intent to the school's Office of Student Services as soon as possible after enrolling at CU-Boulder.

Refer to the School of Education section for more information about teacher education. Interested students may also visit [www.colorado.edu/education](http://www.colorado.edu/education), e-mail [EdAdvise@colorado.edu](mailto:EdAdvise@colorado.edu), or write to the School of Education, Office of Student Services, University of Colorado at Boulder, 249 UCB, Boulder, CO 80309-0249, for application and deadline information.

### *College Readiness in English and Mathematics*

The State of Colorado mandates that all undergraduate students entering public institutions of higher education in Colorado be screened for college readiness in reading, writing, and mathematics. To pass the screening requirements, students must present minimum test scores.

Students who have successfully completed four years each of college preparatory English and math courses are deemed to have met the respective requirements regardless of the test score.

Students who do not meet CU-Boulder's criteria for college readiness will be required to demonstrate readiness through an additional examination or to enroll in preparatory courses prior to completing the first 30 semester hours of course work on the Boulder campus. Students who have not demonstrated reading, writing, and/or mathematics readiness will receive additional details after they confirm their intent to enroll at CU-Boulder.

### *Freshman Applicants*

Students are freshman applicants if they are currently enrolled in high school, or if they have earned a high school diploma or its equivalent and have not enrolled in a college or university since graduation.

### *Admission Criteria*

Many factors are considered in evaluating students' applications for admission to CU-Boulder. Although academic performance in high school (high school GPA and the quality of course work) is the most important indicator of success, other factors are also considered. These include students' college entrance test scores (either the SAT or ACT), the trend in their grades, the extent to which the minimum academic preparation standards (MAPS) are met, their personal essays, and the potential contributions they may make to the campus community. For information on MAPS, see the chart on next page.

## Minimum Academic Preparation Standards (MAPS)

One unit equals one year of high school study or one semester of college course work.

	<i>College of Architecture and Planning</i>	<i>College of Arts and Sciences School of Journalism and Mass Communication</i>	<i>Leeds School of Business</i>	<i>College of Engineering and Applied Science</i>	<i>College of Music</i>
<b>English</b>	<b>4</b>	<b>4</b> (includes 2 of composition)	<b>4</b> (includes 2 of composition)	<b>4</b>	<b>4</b>
<b>Mathematics</b>	<b>4</b> (includes at least 2 of algebra, 1 of geometry, and 1 of preparatory math such as trigonometry, analytic geometry, or elementary functions)	<b>4</b> (includes at least 2 of algebra, 1 of geometry, and 1 of preparatory math such as trigonometry, analytic geometry, or elementary functions)	<b>4</b> (includes at least 2 of algebra, 1 of geometry, and 1 of preparatory math such as trigonometry, analytic geometry, or elementary functions)	<b>4</b> (includes at least 2 of algebra, 1 of geometry, and 1 of college preparatory math such as trigonometry, analytic geometry, or elementary functions)	<b>4</b>
<b>Natural science</b>	<b>3</b> (includes physics and/or biology)	<b>3</b> (includes 2 of lab science, 1 of which must be either chemistry or physics)	<b>3</b> (includes 2 of lab science, 1 of which must be either chemistry or physics)	<b>3</b> (includes 1 of physics AND 1 of chemistry or biology, OR 2 of chemistry and 1 of physics or biology, OR 2 of biology AND 1 of chemistry or physics)	<b>3</b>
<b>Social science</b>	<b>3</b> (includes 1 of U.S. or world history and 1 of geography; if U.S. history is used to meet the history requirement, the geography requirement may be met with 1/2 unit of geography and 1/2 unit of world history)	<b>3</b> (includes 1 of U.S. or world history and 1 of geography; if U.S. history is used to meet the history requirement, the geography requirement may be met with 1/2 unit of geography and 1/2 unit of world history)	<b>3</b>	<b>3</b>	<b>2</b>
<b>Single foreign language</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b> (or 2 units in each of 2 separate foreign languages)	<b>2</b>
<b>Academic elective</b>	<b>1</b>				<b>1</b> (in the arts)
<b>TOTAL UNITS</b>	<b>17</b>	<b>17</b>	<b>17</b>	<b>17</b>	<b>16</b>

Applicants whose records reflect nontraditional grading systems, unusual curricula, or high school equivalency through the GED test will receive individual consideration and are urged to apply.

### College Entrance Tests

Applicants should take a college entrance test late in their junior year or early in their senior year of high school. CU-Boulder requires either the SAT or the ACT for admission consideration. The ACT Writing Test is not required for CU-Boulder admission consideration. The highest scores are used in the admission decision. If the same test is taken more than once, the scores are combined on each subsection to give the highest overall score. SAT subject test scores are not required. For more information, see the How to Apply for Undergraduate Admission section.

### Minimum Academic Preparation Standards (MAPS)

Students who graduated from high school in spring 1988 or later are expected to have completed courses that meet certain minimum academic preparation standards (MAPS) before enrolling at CU-Boulder. Any MAPS deficiency will be considered during the admission review process. The MAPS for specific CU-Boulder colleges and schools are listed in this section.

Students may be admitted to CU-Boulder even though they have not met all the MAPS requirements. If that is the case, they are required to complete the appropriate MAPS courses once enrolled, and the credits may be applied toward graduation. *All MAPS deficiencies must be completed prior to graduation from*

*CU-Boulder.* Students may also complete missing MAPS course work in high school, at other colleges or universities, through approved credit-by-examination programs, or by testing out through the appropriate foreign language department.

### Policies Concerning MAPS Deficiencies

The policies of the Boulder campus with respect to completing MAPS course work after enrollment are as follows.

1. Appropriate missing MAPS course work is included in the hours for graduation.
2. All course work toward fulfillment of the MAPS must be taken for a letter grade.
3. It is strongly recommended that students enroll in and complete at least one MAPS course each term, beginning in the first term of enrollment, until such time as all MAPS are completed. This policy applies to new freshmen, transfer students, and students transferring from other academic units on the Boulder campus and from other campuses of the university. Some colleges or schools may impose a sanction if the student does not complete one course per semester toward meeting MAPS deficiencies.
4. All students who first enroll in one academic unit at CU-Boulder and subsequently transfer to another unit are required to meet the MAPS specified for the new unit, irrespective of their completion of MAPS units in their previous college or school.



- Students in double-degree programs must meet MAPS requirements of both degree-granting units.
- Students must consult with a CU-Boulder academic advisor (or read their college or school's academic publications) to determine which specific courses may be used to meet a MAPS requirement.
- Students who complete 50 percent or more of their secondary schooling in a non-U.S. system are exempt from MAPS. Please also review the chart on page 7.

### *Advanced Placement*

CU-Boulder participates in the Advanced Placement program of the College Board. Over one-third of Boulder's entering freshmen submit Advanced Placement (AP) test scores each year. Official scores must be sent to the admissions office directly from the College Board for both first-year students and transfer students. For a guide to specific equivalencies, refer to the chart in this section. For more information, write or call:

AP Exams  
P.O. Box 6671  
Princeton, NJ 08541-6671  
609-771-7300 or toll free 888-225-5427  
[www.collegeboard.com](http://www.collegeboard.com)

Please also review the chart on page 9.

### *International Baccalaureate*

The International Baccalaureate (IB) Diploma programs provide preuniversity study. IB examinations, whether leading to a full IB diploma or to an IB certificate often qualify students for advanced standing at CU-Boulder. In general, credit is granted for approved IB examinations at the higher level with a score of 4 or better.

Students admitted to the University of Colorado at Boulder after June 30, 2003, who have graduated from high school having successfully completed an International Baccalaureate Diploma program shall be granted 24 semester hours of college credit. This credit will be considered toward degree requirements if approved by the college or school. No CU-Boulder tuition shall be charged for these credits. These credits shall be granted, however, only if the student receives a score of 4 or better on an examination administered as part of the IB Diploma program. If the student scores less than 4 on any IB subject test, the credit hours granted shall be reduced accordingly.

An official copy of the diploma with test scores must be sent to the admissions office directly from the IB organization. For a guide to specific equivalencies refer to the chart in this section. For more information on test administration, write or call:

International Baccalaureate Organization  
475 Riverside Drive, 16th floor  
New York, NY 10115  
212-696-4464  
[www.ibo.org](http://www.ibo.org)

For the most current information on how CU-Boulder evaluates IB credit, visit [www.colorado.edu/prospective/freshman/admission/credit.html](http://www.colorado.edu/prospective/freshman/admission/credit.html). Please also review the chart on page 10.

### *Guaranteed Admission for Colorado Resident Freshmen*

The University of Colorado at Boulder guarantees admission to first-time Colorado resident freshmen who meet specific criteria. For a copy of the guaranteed admission guidelines, visit [www.colorado.edu/prospective/freshman/admission/guarantee.html](http://www.colorado.edu/prospective/freshman/admission/guarantee.html), write to Office of

Admissions, University of Colorado at Boulder, 552 UCB, Boulder, CO 80309-0552, or call **303-492-6301**. Guaranteed admission information is also available in all Colorado high school guidance offices.

### *Freshman Applicants Not Granted Admission*

Students who are not granted admission as entering freshmen may consider transferring to CU-Boulder after successful study elsewhere. Students are encouraged to complete at least one full year of transferable college or university course work, including any courses outlined in the minimum academic preparation standards (MAPS) chart that were not met in high school.

### *Transfer Applicants*

Applicants are considered transfer students if they have attempted or enrolled in any college-level course work (at another college or university, or other campus of the University of Colorado), full time or part time, since graduating from high school. Applicants are not considered transfer students if the only college-level classes they have taken were while enrolled in high school. To be considered for admission, transfer students must report all previous college work and have a high school diploma or its equivalent.

### *Admission Criteria*

Transfer applicants are considered for admission on the basis of transfer as well as freshman criteria, including minimum academic preparation standards (MAPS). All transfer applicants who graduated from high school in spring 1988 or later are expected to have completed MAPS requirements before enrolling at CU-Boulder.

A number of factors are considered when the transfer application is evaluated. The types of courses taken are as important as the grade point average. Only courses completed at the time the application is reviewed are considered in computing the cumulative, or overall, GPA. Complete personal essays are required.

Competitive criteria may vary from term to term depending on the overall quality of the applicant group and the number of transfer spaces available for a given college or school. Successful completion of prerequisite or recommended courses is also considered in the admission decision (see specific college and school sections below). For more information on competitive transfer admission guidelines, visit [www.colorado.edu/prospective/transfer/admission](http://www.colorado.edu/prospective/transfer/admission).

### *College of Architecture and Planning*

A college GPA of 2.750 or higher is required. Admission preference is given to students who have taken college-level courses in the areas of architecture, planning, or environmental studies. Completion of courses in related fields of social science, natural science, fine arts, or humanities is also considered in the admission review.

### *College of Arts and Sciences*

Admission preference is given to students who have taken the appropriate general education college-level courses and have a college GPA of 2.500 or better in appropriate general education courses.

### *Leeds School of Business*

Transfer applicants must have a college GPA of 3.000 or higher. Preference is given to students who have completed finite math (or college algebra), calculus, microeconomics, and macroeconomics.

## Advanced Placement (AP) Credit

AP Subject	Examination Title	Exam Score	CU-Boulder Course Equivalent*	Semester Hours
<b>Biology</b>	Biology	5, 4	EBIO 1210, 1220, 1230, and 1240	8
<b>Chemistry<sup>a</sup></b>	Chemistry	5	CHEM 1113/1114 and 1133/1134	10
		4	CHEM 1113/1114	5
<b>Classics</b>	Latin–Virgil	5	CLAS 2114, 2124, 3024	11
		4	CLAS 2114 and 2124	8
		3	CLAS 2114	4
	Latin Literature	5	CLAS 2114, 2124, 3024	11
		4	CLAS 2114 and 2124	8
3	CLAS 2114	4		
<b>Computer Science</b>	Computer Science A	5	CSCI 1300	4
	Computer Science AB	5	CSCI 1300 and 2270	8
		4	CSCI 1300	4
<b>Economics</b>	Economics: Micro	5, 4	ECON 2010	4
	Economics: Macro	5, 4	ECON 2020	4
<b>English</b>	English Literature and Composition	5, 4	ENGL 1500	3
	English Language and Composition <sup>c</sup>	5	WRTG 1150 and 1250	6
		4	WRTG 1150	3
<b>Environmental Science</b>	Environmental Science	5, 4	ENVS 1000	4
<b>Fine Arts</b>	Studio–Drawing Portfolio or Studio–General Portfolio	5, 4	ARTS 1012	3
	Art History	5, 4	ARTH 1300 and 1400	6
		5, 4	ARTH 1300 and 1400	6
<b>Foreign Language</b>	Chinese Language and Culture	5	CHIN 1020, 2110, and 2120	15
		4	CHIN 1020 and 2110	10
		3	CHIN 1020	5
	French Language	5	FREN 2110, 2120, and 2500	9
		4	FREN 2110 and 2120	6
		3	FREN 2110	3
	French Literature	5, 4	FREN 3110 and 3120	6
		3	FREN 3120	3
		7	FREN 3120	7
	German Language	5	GRMN 2020 and 3010	7
		4	GRMN 2010 and 2020	8
		3	GRMN 2010	4

\* There is no guarantee that all AP credit will apply to a specific degree program. The dean's office of each college and school makes the final determination on how AP credits apply toward degree requirements.

<sup>a</sup> Engineering students: CHEM 1113/1114 fulfills departmental requirements in all areas. CHEM 1133/1134 fulfills chemical engineering, chemical and biological engineering, environmental engineering, and computer science requirements.

<sup>b</sup> Students who want to continue taking Spanish courses beyond their AP credit level must take the Spanish department placement test. If the results of this test place them below their AP level, the Spanish department strongly recommends enrolling at the lower of the two levels.

AP Subject	Examination Title	Exam Score	CU-Boulder Course Equivalent*	Semester Hours
<b>Foreign Language (cont.)</b>	Japanese Language and Culture	5	JPNS 1020, 2110, and 2120	15
		4	JPNS 1020 and 2110	10
		3	JPNS 1020	5
	Italian Language and Culture	5	ITAL 1020, 2110, and 2120	11
		4	ITAL 1020 and 2110	8
		3	ITAL 1020	5
	Spanish Language <sup>b</sup>	5	SPAN 2110, 2120, and 3000	11
		4	SPAN 2110 and 2120	6
		3	SPAN 2110	3
	Spanish Literature <sup>b</sup>	5	SPAN 3340 and 3700	6
4		SPAN 3700	3	
<b>Geography</b>	Human Geography	5, 4, 3	GEOG 1992	3
<b>Government</b>	Comparative United States	5, 4	PSCI 2012	3
	United States	5, 4	PSCI 1101	3
<b>History</b>	U.S. History	5, 4	HIST 1025	3
	European History	5, 4	HIST 1020	3
	World History	5, 4	Determined by department <sup>c</sup>	3
<b>Mathematics</b>	Math–Calculus AB <sup>d</sup>	5, 4	MATH 1300 or APPM 1350 (engineering)	5
		5, 4	MATH 1300 and 2300 or APPM 1350 and 1360 (Engineering)	10
	Math–Calculus BC <sup>d</sup>	3	MATH 1300 or APPM 1350 (engineering)	5
		5, 4, 3	APPM 1350 (engineering)	4
	Math–Calculus BC and AB sub score <sup>d,e</sup>	2, 1	MATH 1300 or APPM 1350 (engineering)	5
		5, 4	APPM 1350 (engineering)	4
Statistics <sup>a</sup>	5, 4	MATH 2510	3	
<b>Music</b>	Music Listening and Literature	5	MUEL 1832 and 2751	6
		4	MUEL 1832	3
	Music Theory	5	MUSC 1101, 1111, 1121, and 1131	6
		4	MUSC 1101 and 1121	3
<b>Physics</b>	Physics B <sup>c</sup>	5, 4	PHYS 2010 and 2020	10
	Physics C–Mechanics	5, 4	PHYS 1110	4
	Physics C–Electricity and Magnetism	5, 4	PHYS 1120	4
		5, 4	PHYS 1120	4
<b>Psychology</b>	Psychology	5, 4	PSYC 1001	4

<sup>c</sup> Three lower-division credits meeting the historical context core requirement in the College of Arts and Sciences and the Leeds School of Business.

<sup>d</sup> Specific credit awarded may depend on major. Check with faculty advisor in major department.

<sup>e</sup> Students taking the Calculus BC exam automatically receive an AB sub score.

NOTE: This chart was prepared based on spring 2009 exams. Credit awarded is subject to change based on faculty review of spring 2010 exams.

### School of Education

Students who have completed a bachelor's degree may apply for admission directly to the School of Education. All other undergraduate students must be admitted to another college or school before applying to a CU-Boulder teacher education program.

To be considered for admission to the teacher education program, an undergraduate must have completed a minimum of 56 semester hours of course work and have met the admission requirements outlined in the School of Education section.

### College of Engineering and Applied Science

A college GPA of 2.900 or higher for four-year institutions; 3.100 or higher for community college and junior colleges is required. Transfer applicants must have taken courses relevant to an engineering curriculum, including at least two semesters of college-level calculus, along with two semesters of calculus-based physics and/or college-level chemistry. Chemical engineering and chemical and biological engineering applicants should have completed

two semesters of college chemistry. Grades in math, science, and engineering courses should be B or higher. (*Exception: Students [resident or non-resident] who apply for admission for a semester that occurs within 18 months of their high school graduation date may also be competitive without having taken the above course work, as long as the high school academic record meets the current Guaranteed Admission for Colorado Freshmen criteria. In addition, if any college-level work has been completed, the overall GPA should be 3.100 or higher.*)

### School of Journalism and Mass Communication

Applicants must have a minimum of 30 semester hours of appropriate college-level course work completed or in progress, including journalism course prerequisites (Contemporary Mass Media, and either Principles of Advertising or Principles of Journalism at CU-Boulder, or their equivalents at another institution), and must have a minimum 3.000 overall and a minimum 3.000 in all journalism courses. Applicants with fewer than the

## International Baccalaureate (IB) Equivalency

IB Subject Examination Title	Level of Exam.	Exam Score	CU-Boulder Course Equivalent*	Semester Hours
<b>Anthropology</b>	Higher	4	ANTH 2100 and 3 lower-division credits meeting cultural and gender diversity core requirement	6
<b>Art</b>	Higher	4	Elective credits (consult faculty with portfolio for further consideration of fine arts course equivalents)	6
<b>Biology</b>	Higher	4	EBIO 1210, 1220, 1230, and 1240	8
<b>Business and Management</b>	Higher	4	BCOR 1010 and BCOR 2--- (lower-division business elective)	6
<b>Chemistry</b>	Higher	5	CHEM 1113/1114 and 1133/1134	10
	Higher	4	CHEM 1113/1114	5
<b>Chinese (A-1)</b>	Higher	4	CHIN 3110, 3120	10
	Standard	4	CHIN 2110, 2120	10
<b>Chinese (A-2)</b>	Higher	4	CHIN 3110, 3120	10
	Standard	4	CHIN 2110, 2120	10
<b>Chinese AB Initio</b>	Standard	5, 6, 7	CHIN 1010, 1020	10
<b>Chinese (B)</b>	Higher	6, 7	CHIN 3110, 3120	10
	Higher	4, 5	CHIN 2120, 3110	10
	Standard	4	CHIN 2110, 2120	10
<b>Dance</b>	Higher	4	Elective credits	1-3
<b>Design Technology</b>	Higher	4	Elective credits	6
<b>Economics</b>	Higher	4	ECON 1000	4
<b>English (A-1)</b>	Higher	4	ENGL 1500	3
<b>English (A-2)</b>	Higher	4	ENGL 1500	3
<b>French (A-1)</b>	Higher	4	FREN 3050 and 3100	6
<b>French (A-2)</b>	Higher	7, 6	FREN 3010, 3050, and 3100	9
	Higher	5, 4	FREN 2110 and 2120	6
<b>French (A-2)</b>	Standard	7, 6	FREN 1050 and 2110	8
<b>French B</b>	Higher	7	FREN 2120 and 2500	6
	Higher	6, 5	FREN 2110 and 2120	6
	Higher	4	FREN 2120	3
<b>French B</b>	Standard	7	FREN 2110 and 2120	6
	Standard	6	FREN 2110	3
	Standard	5	FREN 1050	5
	Standard	4	FREN 1010	5
<b>French AB</b>	Initio	7	FREN 1050	5
	Initio	6, 5	FREN 1010	5
<b>Geography</b>	Higher	4	GEOG 1992 and 3 lower-division credits	6
<b>German (B)</b>	Higher	6, 7	GRMN 2020 and 3010	7
	Higher	5, 4	GRMN 2010 and 2020	8
	Standard	4	GRMN 1010 and 1020	8
<b>History: Africa</b>	Higher	4	HIST 1208 and 3 lower-division credits meeting historical context core requirement	6
<b>History: Americas</b>	Higher	4	HIST 1025 and 3 lower-division credits meeting historical context core requirement	6
<b>History: East and Southeast Asia and Oceania</b>	Higher	4	Six lower-division credits meeting historical context core requirement	6
<b>History: Europe</b>	Higher	4	HIST 1020 and 3 lower-division credits meeting historical context core requirement	6
<b>History: South Asia and Middle East</b>	Higher	4	Six lower-division credits meeting historical context core requirement	6
<b>Islamic History</b>	Higher	4	HIST 1308 and 3 lower-division credits meeting historical context core requirement	6

required hours, lacking the minimum GPAs, or without journalism course prerequisites should apply to the College of Arts and Sciences as prejournalism and mass communication majors. For more information, see the School of Journalism and Mass Communication section.

### College of Music

A college GPA of 2.750 or higher and an audition of all applicants is required. More information may be found in the General Admission Information and College of Music sections.

B Subject Examination Title	Level of Exam.	Exam Score	CU-Boulder Course Equivalent*	Semester Hours
<b>Italian (A-1)</b>	Higher	4	ITAL 3010 and 2130	6
<b>Italian (A-2)</b>	Higher	7, 6	ITAL 3010 and 2130	6
	Higher	5, 4	ITAL 2110 and 2120	6
<b>Italian (A-2)</b>	Standard	7, 6	ITAL 1020 and 2110	8
<b>Italian B</b>	Higher	5, 6, 7	ITAL 2110 and 2120	6
	Higher	4	ITAL 2110	3
<b>Italian B</b>	Standard	7	ITAL 2110 and 2120	6
	Standard	6	ITAL 2110	3
	Standard	5	ITAL 1020	5
	Standard	4	ITAL 1010	5
<b>Italian AB</b>	Initio	7	ITAL 1020	5
	Initio	6, 5	ITAL 1010	5
<b>Japanese (A-1)</b>	Higher	4	JPNS 3110, 3120	10
	Standard	4	JPNS 2110, 2120	10
<b>Japanese (A-2)</b>	Higher	4	JPNS 3110, 3120	10
	Standard	4	JPNS 2110, 2120	10
<b>Japanese AB Initio</b>	Standard	5, 6, 7	JPNS 1010, 1020	10
<b>Japanese (B)</b>	Higher	6, 7	JPNS 3110, 3120	10
	Higher	4, 5	JPNS 2120, 3110	10
	Standard	4	JPNS 2110, 2120	10
<b>Korean</b>	N/Ab	4	Lower-division credit in Asian Languages and Civilizations	1
<b>Latin</b>	Higher	4	Waives MAPS foreign language requirement	—
<b>Mathematics</b>	Higher	5	MATH 1300 and 2300	10
	AND Further		OR APPM 1350 and APPM 1360 (engineering)	8
<b>Mathematics</b>	Higher	5	MATH 1050, 1070, 1300, and 1 general math credit	8
			OR APPM 1350 (engineering)	4
	Higher	4	General lower-division credit applied to the Quantitative Reasoning Mathematical Skills core requirement	3
<b>Music</b>	Higher	4	Elective credits	6
<b>Philosophy</b>	Higher	4	PHIL 1000 (meets ideals and values core requirement) and 3 lower-division credits	6
<b>Physics</b>	Higher	4	PHYS 2010 and 2020	10
<b>Psychology</b>	Higher	4	PSYC 1001 and 2 lower-division credits	6
<b>Russian (B)</b>	Higher	4	RUSS 2010 and 2020	8
	Standard	5	RUSS 2010 and 2020	8
<b>Spanish (A-1)</b>	Higher	4	SPAN 3000 and 3100	8
<b>Spanish (A-2)</b>	Higher	7, 6	SPAN 2110, 2120, and 3000	11
		5, 4	SPAN 2110 and 2120	6
	Standard	7, 6	SPAN 1020 and 2110	8
<b>Spanish (B)</b>	Higher	7, 6	SPAN 2110, 2120, and 3000	11
	Higher	5, 4	SPAN 2110 and 2120	6
	Standard	4	SPAN 1010 and 1020	10
<b>Spanish (AB)</b>	Standard	7, 6	SPAN 1010	5
<b>Theatre</b>	Higher	4	THTR 1009, 2003	6

\* There is no guarantee that all IB credit will apply to a specific degree program. The dean's office of each college and school makes the final determination on how IB credits apply toward degree requirements.

NOTE: This chart was prepared based on spring 2009 exams. Credit awarded is subject to change based on faculty review of spring 2010 exams.

### College Entrance Tests

Transfer students are required to submit SAT or ACT scores, except those who have completed 24 or more semester hours of transferable college-level work at the time they apply.

Students' highest scores are used in the admission decision. If the same test is taken more than once, the scores on each subsection are combined to give the highest overall score. SAT subject test scores are not required. For more information, see the How to Apply for Undergraduate Admission section.

### **Minimum Academic Preparation Standards (MAPS)**

Effective with students who graduated from high school in spring 1988 or later, CU expects all transfer students to have completed courses that meet certain minimum academic preparation standards (MAPS). The MAPS requirements for specific CU-Boulder colleges and schools are listed in this section.

MAPS requirements not met in high school may be met through equivalent college-level course work before or after transfer to CU-Boulder. A semester course completed at the college level substitutes for a year of work in high school.

### **Opportunities for Colorado Transfer Students**

A list of transferable state-guaranteed general education courses has been established for students pursuing arts and sciences majors. Contact your current Colorado school, the CU-Boulder Office of Admissions, or visit our website for more information.

Course equivalency guides are available on the Web at [www.colorado.edu/prospective/transfer/admission](http://www.colorado.edu/prospective/transfer/admission), and also in Colorado community college advising offices. These guides provide information on CU-Boulder admission requirements, graduation requirements, and course equivalencies.

Students transferring to a program outside of the College of Arts and Sciences need to work with community college advisors and use the transfer guide to assure that appropriate courses are taken prior to transfer. Students wishing to enter the College of Architecture and Planning or the College of Engineering and Applied Science should be aware that because of the structure of the curriculum, they are encouraged to transfer as early as the beginning of the sophomore year. *Academic programs vary in terms of the maximum number of hours that may be transferred from a community or junior college.*

## **How to Apply for Undergraduate Admission**

### **Application Priority Dates and Admission Notification**

Applications for degree candidates may be submitted beginning in September for the following spring, summer, and fall terms.

The university reserves the right to deny admission to applicants whose total credentials reflect an inability to assume those obligations of performance and behavior deemed essential by the university and relevant to any of its lawful missions, processes, and functions as an educational institution.

### **Spring Freshman Applicants**

Spring applications are processed on a rolling basis. The Office of Admissions begins notifying applicants about admission decisions in October. Decisions are made approximately four to six weeks after an application is complete. Full consideration is given to applications that are complete (including the application fee and all required credentials) by the October 1 deadline.

### **Summer and Fall Freshman Applicants**

There are two admission notification periods for fall and summer 2010 candidates.

### **Non-Binding Early Notification**

Freshman applicants who complete their file by December 1, 2010, are guaranteed early notification and will receive an admission decision on or before January 15, 2011. Students meeting the non-binding, early notification deadline may be admitted, postponed, or denied admission. Postponed students will receive an additional review and are strongly encouraged to

submit additional academic information to strengthen their applications. Students who are postponed do not typically receive an admission decision until April 1, 2011. Early notification students are not required to enroll at the University of Colorado at Boulder, but must, if they choose to attend, confirm their intent to enroll by May 1.

### **Freshman Application Deadline**

The freshman application deadline is January 15, 2011. Students may begin applying and completing their files in September. Admission decisions will be released between December 2, 2010, and April 1, 2011. All applicants with completed files by January 15, 2011, will be notified of their admission decision no later than April 1, 2011. Students must, if they choose to attend, confirm their intent to enroll by May 1.

### **Transfer Applicants**

Transfer applications are processed on a rolling basis. Full consideration is given to transfer applications completed by the October 1 deadline for spring admission, or the April 1 deadline for summer and fall admission. From the time a transfer application is complete, it takes a minimum of four to six weeks for it to be reviewed.

### **Complete an Online Application**

Applicants should use the online application form at [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

For a student to be considered for admission, the Office of Admissions must receive a completed application, the application fee, and all required credentials. Processing of an application will be delayed until all required information is received.

### **Application Fee**

The \$50 application fee (\$70 U.S. for international students) is nonrefundable. If paying by check or money order it should be made payable to the University of Colorado. **IMPORTANT:** The applicant's name and date of birth must appear on the check or money order.

Some students may be faced with financial constraints in paying the application fee. Therefore, waivers are granted to those students with documented hardships who submit fee-waiver forms available in high schools, from the CU-Boulder Office of Admissions, or at [www.colorado.edu/prospective/freshman/admission/forms.html](http://www.colorado.edu/prospective/freshman/admission/forms.html).

Students currently enrolled in an undergraduate degree program at another University of Colorado campus, who are applying to an undergraduate degree program on the Boulder campus, are not required to pay the application fee.

### **Required Credentials**

Credentials or information sent by fax cannot be accepted as official documentation. Do not submit samples or photographs of design or artwork. A portfolio is not used for admission purposes and cannot be returned.

### **Official Transcripts**

*Official transcripts must be sent directly to the Office of Admissions from the issuing institution* and must have the appropriate seals and signatures. Other transcripts are not considered official. Transcripts that are marked, for example, "student copy," "issued to student," or "unofficial" are not accepted as official. Unofficial transcripts cannot be used for admission or transfer credit purposes.

### High School Transcript

Students should request that their high school send an official transcript of all work completed, beginning with grade 9, directly to the Office of Admissions, regardless of the number of college hours the student has completed (if any) or the date at graduation from high school. Students who have attended more than one high school and whose most recent transcript does not include the complete high school record must submit official transcripts from each school. If any part of the high school record is missing from the transcript, the processing of the application will be delayed. Students who have not graduated and do not plan to graduate from high school must request an official certificate of high school equivalency and official GED scores, plus an official transcript of any high school work (grades 9–12) completed, to be sent to the Office of Admissions.

### College Transcripts

Students should request that their official transcripts from each collegiate institution attended (except any campus of the University of Colorado) be sent directly from the issuing institution to the Office of Admissions. Be sure to include all institutions, regardless of the length of attendance, whether or not courses were completed, and whether or not the record might affect admission or transfer credit. Also, include any institutions attended during summers, interim terms, and during high school. *Failure to list and submit transcripts from all institutions previously attended before enrolling at CU-Boulder is considered to be a violation of academic ethics and may result in the cancellation of admission or dismissal from the university.*

### SAT or ACT Test Scores

Boulder requires SAT or ACT scores for admission. The ACT will be accepted with or without the writing test. Students should request that the testing agency submit scores directly to the Office of Admissions. CU-Boulder's code for the SAT is 4841; the code for the ACT is 0532. Scores recorded on an official high school transcript are also acceptable. *These scores must be submitted unless 24 or more semester hours of transferable college work have been completed at the time of application.* Do not delay sending in the application and other credentials because college entrance test scores are not yet available.

Results from SAT or ACT tests taken in December or later may be received too late to be considered for summer or fall admission of the same year.

For further information, consult a high school counselor, visit the SAT website at [www.collegeboard.com](http://www.collegeboard.com), phone 609-771-7600, or write to the College Board (SAT), P.O. Box 6200, Princeton, NJ 08541-6200. Visit the ACT website at [www.act.org](http://www.act.org), phone 319-337-1270, or write to ACT Registration, P.O. Box 414, Iowa City, IA 52243-0414.

### Personal Essays

The University of Colorado at Boulder requires applicants to submit two short personal essays. Applications without essays are considered incomplete and will not be reviewed. Personal essays are the best way for the Office of Admissions to learn about applicants as individuals and to evaluate a student's academic performance within the appropriate context. There are no "correct" answers to the questions—responses should reflect the unique aspects and experiences of the applicant. The specific essay questions are available on the application.

### Letters of Recommendation

Students may submit letters of recommendation if they wish; however, doing so is optional.

### MyCUBoulder Account

MyCUBoulder ([MyCUBoulder.colorado.edu](http://MyCUBoulder.colorado.edu)) is a personalized electronic tool that all undergraduates may use to explore the opportunities available at CU and keep track of what needs to be done before they arrive on campus. Applicants should continue to use their MyCUBoulder account to check their status and take care of other pre-enrollment university business.

### Where to Send the Application, Fee, and Credentials

Unless otherwise instructed, mail all application materials to:

Office of Admissions  
Regent Administrative Center 125  
University of Colorado at Boulder  
552 UCB  
Boulder, CO 80309-0552

### Mailing Address

Applicants must keep their mailing address current at all times. It is used for mailings until the applicant arrives on campus. Notices are also sent to this address regarding admission, registration, and orientation, as well as other information. If an address changes or is no longer valid, notify the Office of Admissions immediately at 303-492-6301.

### Application Checklist

1. application for admission
2. \$50 nonrefundable (\$70 U.S. for international students) application fee (check or money order made payable to the University of Colorado; print student's name and date of birth on check)
3. Official high school transcript
4. Official college transcripts (if applicable)
5. SAT or ACT test scores (if applicable)
6. Personal essays
7. Letters of recommendation (optional)

### Confirmation Procedures

All admitted students are encouraged to confirm their intent to enroll as soon as possible after receiving their admission notification. Admission must be confirmed by official notification and the nonrefundable confirmation deposit of \$200. Students should follow the instructions in their admission notification on how to confirm.

Confirmations and deposits submitted by the dates listed below will be accepted. After these dates, confirmations can be accepted only if space is still available.

### Confirmation Postmark Deadlines

	Fall	Summer	Spring
Freshmen	May 1	May 1	Dec. 15
Transfers	varies; see confirmation instructions		

If students register for classes and then decide not to attend, they may be assessed tuition depending upon the circumstances. Guidelines are given on the registrar's website ([registrar.colorado.edu](http://registrar.colorado.edu)) for spring and fall and in the summer catalog for summer

terms. Close attention must be given to statements regarding policies for new, readmitted, and transfer students.

The confirmation deposits are used as registration deposits each semester as long as registration is completed by the published deadline. Once students have attended CU-Boulder, the deposit (minus any fees or other charges owed) will be returned when they graduate or officially withdraw from the university according to established deadlines.

## Other Undergraduate and Graduate Applicants

### *International Students*

The university invites applications from qualified international students. International applicants are those who already have, or will be applying for, a temporary U.S. visa such as F-1 and J-1. Applicants who are United States citizens, permanent residents, asylees, or refugees are not considered international. These students should follow application and admission procedures for undergraduates or graduates as described elsewhere in this catalog.

Over 1,000 international students from more than 100 countries study at CU-Boulder. Applications for admission are processed by the Office of Admissions. Assistance after admission is provided by International Student and Scholar Services, located in the Office of International Education. Boulder offers a full range of services to international students, including a host family program, orientation, special programs and activities for international students, and personal attention to individual needs.

Intensive English instruction is also offered by the International English Center. For information, go to [www.colorado.edu/iec](http://www.colorado.edu/iec) or write or call the International English Center, University of Colorado at Boulder, 63 UCB, Boulder, CO 80309-0063, 303-492-5547.

International students who wish to pursue a full-time program of study at the undergraduate or graduate level should go to the international student website at [www.colorado.edu/prospective/international](http://www.colorado.edu/prospective/international) for admission information and online application forms.

Prospective graduate students should go to the website at [www.colorado.edu/prospective/graduate](http://www.colorado.edu/prospective/graduate) for information and application forms specific to the academic department in which they are interested. Prospective graduate students can also call the campus telephone operator at 303-492-1411 and ask to have the call transferred to the department of interest or write to the specific department, University of Colorado at Boulder, Boulder, CO 80309.

### **International Nondegree Students**

An individual who holds a temporary nonimmigrant visa or temporary immigration status may register as a nondegree student only after demonstrating English proficiency through the approval to register process administered by the International English Center, and only if the individual also meets academic prerequisites. The University of Colorado at Boulder does not issue I-20 Forms or assume any immigration responsibility for nondegree students. Therefore, international nondegree students must maintain appropriate immigration status independent of the university. See the Nondegree Students section for more information. International nondegree applicants should e-mail the International English Center, [ieccu@colorado.edu](mailto:ieccu@colorado.edu), to obtain instructions and approval to register.

### *Readmit Students*

Former CU-Boulder degree students who are not currently enrolled on the Boulder campus for fall 2010 must submit the Application for Readmission for undergraduate degree students. No application fee is required. Students who have attended any college or university since their last attendance at CU-Boulder will need to submit official transcripts directly from the issuing institution(s) to the Office of Admissions.

If the student is changing from a previous college or school, the change should be noted on the application. Otherwise, it is assumed that the student is returning to the same field of study, if eligible to do so. If a college or school change is requested for which the student is not eligible, the student will need to request reconsideration for his or her previous program.

Former arts and sciences students wishing to return to arts and sciences must apply to their previous major. Students who wish to pursue a second undergraduate degree must apply to a major different from the one in which they received their degree. Students may not apply for a second bachelor's degree in the Leeds School of Business or the School of Journalism and Mass Communication.

Beginning fall semester 2010, undergraduate degree students who are enrolled or enroll and then withdraw for the current semester will have up to four semesters, including summer, to return to the university without having to reapply for admission. *EXCEPTION: Students who last enrolled for a spring semester (beginning spring 2011) will have up to five semesters, including summer, to return without having to reapply.*

The above policy is not applicable to graduate students but these students may be eligible for the Time Off Program if they wish to take a leave of absence. Graduate students not eligible for the Time Off Program will need to reapply for admission. This policy also is not applicable for new degree students (or transfer students) who enroll and then withdraw prior to the census date. For more information, see [registrar.colorado.edu](http://registrar.colorado.edu). Degree students who withdraw from CU-Boulder during summer session may not need to reapply to continue into the fall semester unless they are changing schools, colleges, or degree programs.

### *Nondegree Students*

Students who wish to take University of Colorado at Boulder courses but are not currently admitted to a degree program at the university are classified as "nondegree students." Students apply as nondegree students through the Division of Continuing Education and Professional Studies (303-492-5148 or [conted.colorado.edu](http://conted.colorado.edu)). Nondegree students may enroll in credit classes through the ACCESS (Available Credit Courses for Eligible Special Students) Program, the Boulder Evening Program, CAETE (Center for Advanced Engineering and Technology Education), the Independent Learning Program, Applied Music Program, and Summer Session. Continuing Education also offers a variety of noncredit classes.

If students have been denied admission to an undergraduate degree program, they may not enroll as nondegree students in the ACCESS Program for the semester for which they sought degree program admission. Nondegree student admission does not guarantee future admission to any degree program.

Nondegree students may also enroll for courses on a *pass/fail* basis. These courses are counted toward hours of *pass/fail* course work permitted according to the rules of the college or school to which students are admitted once they achieve degree status.

Nondegree students must maintain a 2.000 cumulative GPA. Failure to maintain the required GPA will result in academic suspension.

High school students interested in taking courses at CU-Boulder apply as nondegree students through the High School Concurrent Program administered by the division.

More information may be obtained by calling the Division of Continuing Education and Professional Studies at **303-492-5148** or visiting [conted.colorado.edu](http://conted.colorado.edu).

International students who want to apply to the university as nondegree students should read the International Students section above. Students interested in teacher licensure should refer to the School of Education section.

#### **Nondegree Students Transferring to a Degree Program**

Students who are currently enrolled or have been enrolled at any CU campus as nondegree students may apply for admission to an undergraduate degree program.

Students wishing to transfer to a graduate degree program should refer to the Graduate School section and individual college and school sections.

A degree-seeking applicant may transfer an unlimited number of credits taken as a nondegree student on any University of Colorado campus. However, applicability of these hours toward degree requirements is established by the colleges and schools. It is suggested that a student apply to a degree program as soon as admission requirements, including MAPS deficiencies, have been met. It is essential that former nondegree students actively seek academic advising from the appropriate dean's office once they have been accepted into a degree program.

#### **Second Undergraduate Degree Applicants**

Students may apply for a second undergraduate degree at the University of Colorado at Boulder, but should explore the various options in graduate study available at the university before doing so. Students applying for a second undergraduate degree must follow transfer admission guidelines, and those students who are admitted must keep in mind that all college and major requirements must be met in order to complete degree programs satisfactorily. Restrictions mandated by general university policies, as well as specific college and school policies, include the following:

1. Applicants may not apply to the major in which they received their first undergraduate degree.
2. Applicants must apply to a specific major; applications for an open option or undetermined major cannot be considered.
3. Second undergraduate degree applicants in the College of Architecture and Planning are encouraged to investigate graduate programs.
4. The Leeds School of Business and the School of Journalism and Mass Communication do not consider students who have already completed an undergraduate degree. These students are strongly encouraged to investigate graduate study.
5. Students who already have an undergraduate degree from the College of Engineering and Applied Science and who desire a second undergraduate degree are strongly encouraged to investigate graduate study as an option.
6. The School of Education offers graduate and teacher certification programs only.
7. Credit hours earned as a nondegree student at the University of Colorado may not be used toward major degree require-

ments for a second degree in the College of Arts and Sciences.

#### **Students from Other CU Campuses**

Students who wish to transfer to Boulder from another University of Colorado campus (Colorado Springs or Denver), from CU Study Abroad, or from CU Continuing Education and Professional Studies should refer to the Transfer Applicants section. These students must send a high school transcript, SAT or ACT scores, and an official transcript from each college or university attended (outside the University of Colorado system) to the Office of Admissions. Currently enrolled degree students are not required to pay the application fee. Special consideration is given to applicants transferring from degree programs at other campuses of the University of Colorado. Course work completed at other campuses in the University of Colorado System will be a part of the student's cumulative university record and will not be considered as transfer credit. However, the applicability of this course work toward specific CU-Boulder degree requirements will be determined solely by CU-Boulder colleges and schools. External transfer credit presented by students to other University of Colorado campuses will be evaluated by CU-Boulder guidelines upon the student's matriculation into a degree program at CU-Boulder.

#### **Transfer of College-Level Credit**

The Office of Admissions performs an initial evaluation of transfer credit after applicants have been admitted. A complete evaluation of transfer credit cannot be made until all official credentials have been received.

The evaluation is made using the official transcripts sent directly to the university from each one of the applicant's previous colleges. Official transcripts exhibit the official seal and signature of the registrar. Transcripts that are marked "student copy," "issued to student," or "unofficial" are not accepted as official. Faxed transcripts are not accepted.

Course work of comparable content and scope to the University of Colorado at Boulder curriculum will be considered for transfer credit if it was completed at colleges or universities accredited by the North Central Association of Colleges and Schools, or other regional associations at the time the work was completed. If course work was completed at a school not regionally accredited, the recommendations of American Association of Collegiate Registrars and Admissions Officers (AACRAO) will be considered. For international colleges or universities, the international equivalent of regional accreditation or Ministry of Education recognition will be considered.

Exceptions to recognition of regional accreditation:

- Transferability is based on the practices of the leading university in the state where the institution is located will be considered.
- For Advanced Placement, International Baccalaureate, College Level Examination Program, or Military Credit, refer to the detailed criteria stated in the corresponding sections.

#### **Evaluation of Credit**

Only courses taken at a college or university of recognized standing with grades of C- (1.700) or better are accepted for transfer. All transferred courses are recorded on the student's academic record.

Each college and school at CU-Boulder determines:

- How transferred course semester credit hours are applied toward graduation requirements in accordance with the policies of the college or school
- The maximum number of semester credit hours that may transfer from a two-year or four-year postsecondary institution
- The minimum number of semester credit hours that must be completed on the Boulder campus in order to receive a degree
- The minimum number of semester credit hours that must be completed as a degree student in residence on the Boulder campus to receive an undergraduate degree
- The maximum number of semester credit hours earned through correspondence or in a similar format that are accepted toward a baccalaureate degree

Credit hours should have been earned no more than 10 years prior to transferring into an undergraduate degree program at the University of Colorado at Boulder. Any determination of acceptance of semester credit hours toward the degree based on the content and the age of the credit is made in the college or school dean's office or by the student's major department.

College-level work taken during high school is evaluated in accordance with general guidelines for transfer credit at CU-Boulder. Official college transcripts of work taken must be received in order for transfer credit to be awarded.

#### ***Course Work Requiring Additional Review***

The following course work will require additional information before a decision can be made on acceptance for transfer credit.

- Independent study courses
- Internships
- Workshops
- Graduate course work
- Military credit
- Professional programs

#### ***Course Work Not Accepted for Transfer Credit***

The following course work will not be accepted for transfer credit and will not count toward a degree at Boulder:

- any courses in which the grade earned is below a C- (1.700)
- courses identified by CU-Boulder as remedial, such as remedial English, mathematics, science, and developmental reading
- vocational-technical courses that are offered at two-year and proprietary institutions (exceptions may be granted only by the CU-Boulder dean responsible for the student's curriculum—when exceptions appear to be warranted, appropriate department heads make recommendations to their respective deans regarding credit for such courses)
- courses in religion that constitute specialized religious training or that are doctrinal in nature
- credits earned for work experience or through a cooperative education program
- outdoor leadership education course work
- credits earned in physical education activity courses
- courses or programs identified as college orientation

#### ***Appeals Process***

Students who wish to appeal the transferability of course work must write a letter within the first semester after the work is posted on the University of Colorado at Boulder record or after receiving notice from the Office of Admissions that the course work was not accepted for transfer credit. The letter must be addressed to the Transfer Credit Department, Office of Admissions and include:

- The name(s) of the previous institution(s) attended, the course number and title of each course for which the student was denied transfer credit, and the date(s) of enrollment in each course
- A copy of the catalog description (from the appropriate year) for each course in question
- A copy of the syllabus or course outline (from the appropriate year) for each course in question. This information can be obtained from the sending institution
- A statement indicating why the credit(s) should be accepted

The Admissions Office will re-evaluate the course(s) for which the student is requesting reconsideration in consultation with the appropriate dean or chair. A written response will be delivered to the student in a timely manner once the appropriate faculties have reviewed the course materials, past practices, and the student's specific circumstances.

#### ***University of Colorado Campuses***

Course work completed at other campuses in the University of Colorado system will be a part of the student's cumulative university record and will not be considered as transfer credit. However, the applicability of this course work towards specific CU-Boulder degree requirements will be determined solely by CU-Boulder colleges and schools. External transfer credit presented by students to other University of Colorado campuses will be evaluated by CU-Boulder guidelines upon the student's matriculation into a degree program at CU-Boulder.

#### ***Number of Credit Hours Required for Graduation***

Transfer students are held to the same residency and degree requirements as students who begin their undergraduate degree program on the Boulder campus. This assumes that transfer credit hours are in courses comparable in level and content to those required for graduation from an undergraduate degree program at the Boulder campus. College or school residency requirements, meaning the number of hours required to be taken as a degree student once admitted on the Boulder campus, are the same for transferring and nontransferring students.

#### ***Credit for Correspondence and Online Work***

Each college and school determines the maximum number of credits taken through correspondence and online programs that are accepted toward a baccalaureate degree.

#### ***College-Level Work Taken during High School***

College-level work taken during high school is evaluated in accordance with general guidelines for transfer credit at CU-Boulder. College-level work taken concurrently with a high school program may be used to satisfy MAPS requirements. Official college transcripts of work taken must be received for transfer credit to be awarded.



### Advanced Placement Examinations

Credit for College Board Advanced Placement examinations cannot be evaluated from college or high school transcripts; score reports from the College Board must be submitted directly to the university for evaluation. For more information, and a guide to equivalencies, refer to Freshman Applicants and the chart in this section or download the pdf at [www.colorado.edu/prospective/freshman/admission/credit.html](http://www.colorado.edu/prospective/freshman/admission/credit.html).

### College-Level Examination Program

Credit for College Board subject examinations of the College-Level Examination Program (CLEP) in general biology, general chemistry, general psychology, introductory macroeconomics, introductory microeconomics, introductory sociology, and calculus may be granted for a score at or above the 67th percentile. This credit is applied toward degree requirements at the discretion of the student's dean. Refer to the appropriate dean's office for the policy of that college or school.

Credit for CLEP subject examinations cannot be evaluated from college or high school transcripts; score reports must be submitted directly from the College Board. CLEP general examinations are not accepted for credit at CU-Boulder.

### International Baccalaureate Examinations (IB)

In general, credit is granted for approved IB examinations at the higher level with a score of 4 or better. Credit for IB examinations cannot be evaluated from college or high school transcripts. An IB certificate or diploma must be submitted to the Office of Admissions from the IB organization for evaluation. For more information and a guide to equivalencies, refer to Freshman Applicants and the chart in this section or download the pdf at [www.colorado.edu/prospective/freshman/admission/credit.html](http://www.colorado.edu/prospective/freshman/admission/credit.html).

### Military Credit

Credit for military schooling is evaluated upon receipt of Form DD 214, Service Separation Certificate, or the Sailor/Marine American Council on Edwardian Registry Transcript (SMART). Only work that has received an upper-division baccalaureate recommendation by the American Council on Education (ACE) can be awarded credit. This work, however, is transferred and recorded at the lower-division level. Foreign language credit taken through the State Department, Department of Defense, or Defense Language Institute is assigned the recommended ACE credit.

### Credit by Examination

This option provides limited opportunities for students to take an examination and earn credit for a course without registering for or taking the course. Specific courses must be approved for credit by examination. Students may want to exercise this option if they do not receive transfer credit for a course they have taken at a previous college. Information on participating colleges and schools, requirements, and an application for credit by examination are available at the Office of the Registrar, Regent Administrative Center 105, University of Colorado at Boulder, 20 UCB, Boulder, CO 80309-0020, 303-492-6970. Permission of the instructor, the department chair, the dean of the college or school in which the course is offered, and the student's dean (if different) is required for approval. An examination fee is charged.

### Transfer Credit Conversion

Many campuses operate on the quarter system, with the academic year divided into three terms. Other campuses, including CU-Boulder, operate on a two-term or semester system. Course

credits from quarter system institutions must be converted from quarter hours to semester hours or credits. One quarter credit is equivalent to two-thirds of a semester credit. To convert quarter hours to semester hours, multiply the number of quarter hours by two-thirds and round off the total to the nearest tenth. For example, 4 quarter hours  $\times \frac{2}{3} = 2.67$  or 2.7 semester hours of credit, or 3 quarter hours  $\times \frac{2}{3} = 2$  semester hours of credit.

### Intrauniversity Transfer Students

Students wishing to change colleges or schools within the CU-Boulder campus must obtain an Intrauniversity Transfer (IUT) application from the college or school to which they wish to transfer.

For more information on recommended course work in preparation for an IUT and other criteria, students need to consult college and school sections of this catalog or talk with an academic advisor in the program to which they plan to transfer. Some colleges and schools do not accept intrauniversity transfer students during the summer. It is important to note that admission to a college through the IUT process is competitive, and not all students who apply are admitted. Decisions are based on course preparation, hours completed, grade point average, and other criteria required by the specific college or school.

### Denied Admission as a Freshman

Students who were not admissible to the University of Colorado at Boulder based on high school academic records are encouraged to apply for transfer admission after at least 24 semester hours of transferable college-level course work are completed or in progress. This includes any minimum academic preparation standards (MAPS) requirements not met in high school.

## Graduate Admission

Graduate student admission is handled by individual academic departments. See the Graduate School section for more information.

## Academic Records

### Class Level

Class level is based on the total number of semester hours passed, as follows:

Class	Semester Hours
Freshman	0–29.9
Sophomore	30–59.9
Junior	60–89.9
Senior	90–123.9
Fifth-Year Senior	124 and above

The normal course load for most undergraduates is 15 credit hours each semester.

### Course Load

The following are the most widely used general definitions of full-time course load. For further information and guidelines, students should see specific college and school sections of this catalog. *Students who receive financial aid or veterans benefits or who live in university housing should check with the appropriate office regarding course-load requirements for eligibility purposes.*

### Undergraduate Course Load

For financial aid purposes, full time is 12 or more credit hours for fall, spring, and summer terms.

For enrollment verification and academic purposes (*not related to financial aid*), 12 credit hours is considered a full-time load in the fall or spring semester, and 6 credit hours is considered full time in the summer.

### Graduate Course Load

A full-time graduate student in the fall or spring semester is one who is enrolled for 5 credit hours of graduate course work, 8 hours combined graduate/undergraduate course work, 12 hours of undergraduate course work, or thesis hours depending upon the student's status. These hours also apply for enrollment verification purposes. Consult the Graduate School dean's office for requirements. For financial aid or program requirements for full- or part-time status, which are different than those set by the Graduate School, consult the Office of Financial Aid. Law students must be enrolled for a minimum of 10 credit hours to be considered full-time in the fall or spring (5 credit hours in the summer). A maximum of 15 credit hours may be applied toward a degree during the fall and spring semesters for graduate students and a maximum of 18 credit hours during the fall and spring semesters for law students.

A full-time graduate student in the summer term is one who is enrolled for at least 3 credit hours in graduate course work, 4 hours combined graduate/undergraduate course work, 6 hours of undergraduate course work, or thesis hours depending upon the student's status. The maximum number of graduate credits that may be applied toward a degree during the summer session is 6 credit hours per five-week term and 10 credit hours per 10-week summer session, not to exceed 10 credit hours for the total summer session.

### Satisfactory Academic Progress

Satisfactory academic progress in most undergraduate colleges and schools requires a 2.000 grade point average (GPA). Students should consult their dean's office regarding college or school minimum GPA requirements and special policies on probation and dismissal. Students must maintain satisfactory academic progress to receive financial aid.

### Grading System

The following grading system is standardized for all colleges and schools of the university. Each instructor is responsible for determining the requirements for a class and for assigning grades on the basis of those requirements.

Standard Grade	Credit Points per Each Hour of Credit
A = superior/excellent	4.0
A- =	3.7
B+ =	3.3
B = good/better than average	3.0
B- =	2.7
C+ =	2.3
C = competent/average	2.0
C- =	1.7
D+ =	1.3
D =	1.0
D- = minimum passing	0.7
F = failing	0.0

#### Grade Symbols

I = incomplete; changed to F if not completed within one year

IP = in progress; thesis at the graduate level or specified graduate-level courses

P = passing; under the pass/fail option, grades of D- and above convert to a P. Other specified courses may also be graded on a pass/fail basis.

NC = no credit

W = withdrawal or drop without discredit

\*\*\* = class grades were not submitted when final grades were processed, or the student is currently enrolled in the course.

### Explanation of an I (Incomplete) Grade

An I grade is an incomplete grade. If the requirements for the course are not completed within one year, the I grade will be converted to an F. Use of the I grade is at the discretion of the faculty and/or the academic dean's office.

Students must ask for an incomplete grade. An incomplete is only given when students, for reasons beyond their control, have been unable to complete course requirements. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given.

If an instructor grants a request for an incomplete, the instructor sets the conditions under which the course work can be completed and the time limit for its completion or if the course should be retaken. If a course is retaken, it must be completed on the Boulder campus or in Boulder evening classes, and the student must re-register for the course and pay the appropriate tuition.

The final grade (earned by completing the course requirements or by retaking the course) does not result in the deletion of the I from the transcript.

### Grade Point Average

The overall University of Colorado grade point average (GPA) is computed as follows: the credit hours and credit points are totaled for all courses; then the total credit points are divided by the total credit hours. Courses with grade symbols of P, NC, \*\*\* (grade not yet entered), W, I, and IP are excluded when totaling the hours, however, grades of F earned for courses graded on a pass/fail option are included in the GPA. Is that are not completed within one year are calculated as Fs in the GPA at the end of the one-year grace period.

Grades Earned	Credit Points per Hour	Credit Hours	Credit Points in Course
A	4.0	x	4.0 = 16.0
A-	3.7		4.0 = 14.8
B+	3.3		4.0 = 13.2
P	—	3.0 (exclude)	—
F	0.0	3.0	0.0
			<b>15 credit hours 44 points</b>
			<b>TOTAL = 44/15 = 2.93 GPA</b>

The Course Repetition Program on the Boulder Campus (see [registrar.colorado.edu](http://registrar.colorado.edu) for details) is being eliminated. Students will be able to repeat courses under the Course Repetition Program only through the summer semester of 2010. Beginning in the fall of 2010, all grades will be employed to calculate the grade point average, including any courses that are repeated.

Students should refer to their academic dean's office for individual GPA calculations as they relate to academic progress and graduation from their college or school.

### Class Rank

Beginning in the summer of 2007, undergraduate students can get a document that indicates their rank in class compared to those students graduating within the last year. Students in the College of Arts and Sciences and the College of Engineering and Applied Science will have a ranking within their major degree program.

Students at the Leeds School of Business, College of Music, College of Architecture and Planning, and School of Journalism and Mass Communication will have a ranking within students in their college. These forms are available via the Web.

### Official and Career Transcripts

Official transcripts include the complete undergraduate and graduate academic record of courses taken at all campus locations or divisions of the University of Colorado. It contains the signature of the registrar and the official seal of the university. Official transcripts are primarily used to support applications for transfer to other academic institutions and for employment purposes. Transcripts sent to students are labeled “issued to student.”

Career transcripts (law, undergraduate, graduate, non-degree graduate, and non-credit) include only course work and statistics affiliated with a single career at the University of Colorado. Non-credit transcripts only include any Continuing Education/Extended Studies non-credit course work. A career-based transcript is not representative of all course work taken at CU.

Official and career transcripts may be ordered in a variety of ways. Visit [www.colorado.edu/transcripts](http://www.colorado.edu/transcripts) for detailed ordering information. There is no charge for official or career transcripts, which are prepared at the student’s request. However, rush services are available for a fee. Typically, transcript requests are processed within four business days and placed in first-class mail. Transcripts can be withheld for both financial obligations to the university or disciplinary actions that are in progress.

Official transcripts that include end-of-term grades are available approximately two weeks after final examinations. Degrees are recorded approximately six weeks after graduation.

### Unofficial Transcripts

Unofficial transcripts are also a complete academic record of courses taken at the University of Colorado. They are primarily used for advising and counseling within offices on campus and within offices at other University of Colorado campuses. Unofficial transcripts do not carry the registrar signature or seal of the university. Currently enrolled students may access their unofficial transcripts via [MyCUInfo.colorado.edu](http://MyCUInfo.colorado.edu). Students may print this unofficial transcript on any printer. NOTE: the only student identification on this transcript is the appearance of the last four digits of the student ID number at the top of the document.

### Credit by Examination

In limited instances, students enrolled in a degree program may earn additional credit without otherwise registering for and taking certain courses if they pass a written examination. Information on participating colleges and schools and an application for credit by examination may be obtained from the Office of the Registrar in Regent Administrative Center 105. The application specifies procedures to be followed. The following signatures are required for approval: the instructor, the department chair, the dean of the college or school in which the course is offered, and the student’s dean, if different. The fee for each examination is not included in the regular tuition, but it is assessed separately at a fixed rate equivalent to the minimum resident tuition rate charged for 0–3 credit hours for the current semester. Fees are payable in advance and are nonrefundable.

### Holds

A scholastic, dean’s, financial, health, or advising hold may be placed on a student’s record for a number of reasons. A hold prevents a student from registering, returning to school, obtain-

ing an official transcript, or receiving a diploma. The student should resolve each hold as quickly as possible by contacting the campus office that placed it. General inquiries may be addressed to the Office of the Registrar.

### Confidentiality of Student Records

**Annual Notice to Students:** The University of Colorado complies fully with the provisions of the Family Educational Rights and Privacy Act (FERPA) of 1974. The act was designed to protect the privacy of education records, to establish the right of students to inspect and review their education records in all offices, and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the FERPA office concerning alleged failures by the institution to comply with the act.

University guidelines explain in detail the procedures to be used by the institution for compliance with the provisions of the act. Copies of the guidelines may be obtained from the Office of the Registrar and at [registrar.colorado.edu/regulations/ferpa\\_guide.html](http://registrar.colorado.edu/regulations/ferpa_guide.html).

Students wishing to review their education records must come to the Academic Records department of the Office of the Registrar and present proper identification. All other records inquiries must be directed to the proper office, i.e., financial aid, bursar, etc.

Students may not inspect the following, as outlined by the act: financial information submitted by their parents, confidential letters that they have waived their rights to review, or education records containing information about more than one student, in which case the institution will permit access only to that part of the record that pertains to the inquiring student. Records that may be inspected include admissions, academic, and financial aid files, and cooperative education and placement records.

The Family Educational Rights and Privacy Act affords students certain rights with respect to their education records. They are:

1. The right to inspect and review education records within 45 days of the day the university receives their request for access.
 

Students should submit to the registrar, dean, head of the academic department, or other appropriate official, written requests that identify the educational record(s) they wish to inspect. The university official will make arrangements for access and notify them of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise them of the correct official to whom the request should be addressed.
2. The right to request the amendment of students’ education records that they believe are inaccurate or misleading.
 

They may ask the university to amend a record that they believe is inaccurate or misleading. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading.

If the university decides not to amend the record as requested by the student, the university will notify the student of their right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to them when notified of the right to a hearing.
3. The right to consent to disclosures of personally identifiable information contained in their education records, except to

the extent that FERPA authorizes disclosure without consent.

One exception that permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person employed by the university in an administrative, supervisory, academic, research, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the university has contracted (such as an attorney, auditor, collection agent, University of Colorado Foundation, or employment or degree verification agency such as the National Student Clearinghouse); a person serving on the Board of Regents; a student employee; or a student serving on an official committee; or one assisting another school official in performing his or her task. In addition, a student's records may be disclosed to their parent(s) upon request if their parent(s) claim them as a dependent for income tax purposes.

A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility.

Upon request, the university discloses education records without consent to officials of another school in which a student seeks or intends to enroll.

4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the university to comply with the requirements of FERPA. The name and address of the office that administers FERPA is:

The Family Compliance Office  
U.S. Department of Education  
600 Independence Avenue, SW  
Washington, DC 20202-4605  
202-260-3887

The following items of student information have been designated by the University of Colorado at Boulder as public or "directory" information: names; student address (including designated local mailing and permanent); telephone number listed with mailing address; student e-mail address; dates of attendance; registration status; class; college or school; previous educational institutions attended; major/minor fields of study; awards, honors, degree(s) applied for or conferred (including certificates, thesis, and dissertation titles) and dates received; past and present participation in officially recognized sports and activities; physical factors (height and weight) of athletes; prior schools attended; employment related to student status (e.g., teaching assistant, resident assistant, or tutor); class seat assignment; College Opportunity Fund application and authorization status; expected date of completion in enrolled course of study; and student photo (including Buff OneCard photo in certain circumstances). Such information may be disclosed by the institution at its discretion.

### *Withholding Directory Information*

Students have the right to withhold directory information from inquirers. To restrict the release of directory information, go to the Office of the Registrar to complete a "Privacy Form."

### *Student Consent for Release of Confidential Information*

Students may complete a "Student Permission" form that gives parents, spouses, or third parties access to educational records. Students must bring a photo ID to the Office of the Registrar,

Regent Hall room 105, between 9:00 A.M. and 5:00 P.M. to complete this form.

### *Release of Disciplinary Information*

Provisions of the Family Educational Rights and Privacy Act of 1974, as amended by the Higher Education Amendments of 1998, govern access to a student's academic transcript or conduct file. The student and/or those university officials who demonstrate a legitimate educational need for disciplinary information may have access to the student's conduct file. Parent(s), who provide proof that a student is a dependent as defined in Section 152 of the Internal Revenue Code of 1954 (i.e., a copy of the last federal income tax return listing the student as a dependent), can have access to the student's conduct file without written consent of the student. In this case, parents may also have access to a conduct file, even if the student has requested otherwise.

In addition, parent(s) may be notified if a student under 21 is found responsible for a violation involving use or possession of alcohol and controlled substances. All other inquiries, including but not limited to inquiries from employers, government agencies, news media, family, friends, or police agencies, require a written release from the student before access to university conduct files is granted. Exception: Information may be released pursuant to a lawfully issued subpoena and as provided by the Campus Security Act as amended by the Higher Education Amendments of 1992.

The Campus Security Act permits higher education institutions to disclose to alleged victims of any crime of violence (e.g., murder, robbery, aggravated assault, burglary, motor vehicle theft, arson) the results of the conduct proceedings conducted by the institution against an alleged perpetrator with respect to such crime. The Campus Security Act also requires that both the accused and the accuser be informed of campus conduct proceedings involving a sexual assault.

### *In-State and Out-of-State Tuition Classification*

Tuition classification is governed by Colorado statutes and by judicial decisions that apply to all state-funded institutions in Colorado and is subject to change without notice.

New students are classified as in-state or out-of-state residents for tuition purposes on the basis of information provided on their application for admission and other relevant information. Applicants may be required to submit evidence substantiating their claim of in-state eligibility.

Applicants and students who feel their classification is incorrect or who have become eligible for a change to in-state status must submit a petition with documentation in order to have their status changed. The necessary petition forms, deadlines for submission, and an explanation of the Colorado tuition classification statute are available from the Tuition Classification Officer, Regent Administrative Center 105, University of Colorado at Boulder, 68 UCB, Boulder, CO 80309-0068, **303-492-6868**, fax: **303-492-8748**, e-mail: [tuitclass@registrar.colorado.edu](mailto:tuitclass@registrar.colorado.edu), website: [registrar.colorado.edu/students/tuition\\_classification.html](http://registrar.colorado.edu/students/tuition_classification.html).

### *Basic Requirements for Establishing Colorado Residency*

Colorado in-state tuition classification requires domicile (legal residence) in Colorado for 12 consecutive months. Domicile is defined as a person's true, fixed, and permanent home and place of habitation. To establish domicile, a person must reside in Col-

orado and demonstrate that Colorado is his or her permanent home.

In addition to establishing domicile in Colorado, a person must be either 22 years of age or older, married, a graduate student, or an emancipated minor to begin the 12-month period. Unemancipated minors qualify for in-state status if their parents have been domiciled in Colorado for one year.

### Emancipation

To be emancipated, students cannot be supported by their parents in any way. College savings funds and other income-producing assets established by the parents prior to the 12-month period are considered to be parental support.

### Evidence of Domicile

Evidence of Colorado domicile includes actions that would normally be expected of any permanent resident. Factors that constitute evidence of domicile are:

- Payment of Colorado state income tax
- Colorado driver's license
- Colorado vehicle registration
- Voter registration in Colorado
- Ownership and permanent occupancy of residential real property in Colorado
- Permanent employment or acceptance of future permanent employment in Colorado (Note: employment offered by the university to students is not considered permanent)
- Graduation from a Colorado high school
- Continued residence in Colorado while not enrolled as a student

No single factor constitutes conclusive proof of domicile. All factors, positive and negative, are considered. All of the listed factors are not necessary, but individuals should take action on those factors that are appropriate in their circumstances.

### Unemancipated Minors

Students as old as 22 may qualify for in-state tuition if either of their parents, regardless of custody, has been domiciled in Colorado for 12 consecutive months preceding the first day of class in a given semester, even if the students reside elsewhere. In certain circumstances, students may qualify through their parents up to age 23.

Students lose eligibility for in-state tuition if they (or their parents, if the students are unemancipated minors) maintain domicile outside Colorado for one year or more, unless the parents have lived in Colorado at least four years and meet other requirements.

In-state classification becomes effective at the beginning of the first term after one year of legal residence in Colorado. Changes of classification never take effect midterm.

Students who give false information to evade payment of out-of-state tuition or who fail to provide timely notice of their loss of in-state eligibility are subject to retroactive assessment of out-of-state tuition, as well as disciplinary and legal action.

### In-State Status: Other Circumstances

Exceptions to the one-year residence requirement exist for the following:

- Colorado National Guard members
- Active-duty military stationed in Colorado
- Honorably-discharged members of the U.S. armed forces
- Returning active-duty military members
- Canadian military stationed in Colorado
- Employees of companies moving to Colorado receiving government economic incentives

Children of new faculty members at Colorado state colleges and universities

Western Regional Graduate program enrollees

U.S. citizens who are Colorado high school graduates and who attend a Colorado high school for three years immediately preceding enrollment, or Colorado G.E.D. holders who reside in Colorado the three years immediately preceding enrollment

For detailed explanations of the requirements for these exceptions, including spouse and child eligibility, go to [registrar.colorado.edu/students/tuition\\_classification.html](http://registrar.colorado.edu/students/tuition_classification.html).

## Expenses

### College Opportunity Fund

In May 2004, an act of the Colorado state legislature established a new way for the State of Colorado to provide state tax-dollar support for higher education at the undergraduate level. The state is no longer appropriating monies to institutions for undergraduate education, but providing direct funding to undergraduate students through the College Opportunity Fund (COF).

This program, also known as “vouchers” or “stipends,” requires resident undergraduate students to request that COF vouchers be applied to their university bills.

Details of the COF program are determined by the Colorado Commission on Higher Education (CCHE) and the College Assist Program. Updated details are available at [www.cu.edu/ums/cof/faq.html](http://www.cu.edu/ums/cof/faq.html) and [cof.college-assist.org](http://cof.college-assist.org). Students need to *apply* only once but must *authorize* each semester or authorize once for current and future semesters at CU-Boulder. For instructions, see COF information at [registrar.colorado.edu](http://registrar.colorado.edu).

### Confirmation Deposit

All new students (both resident and nonresident) must confirm their enrollment at the university by official notification and deposit of \$200. The deposit is nontransferable and must be paid by all students, regardless of financial aid awards. Students who have paid the deposit and who decide not to attend CU-Boulder forfeit their deposit. Students who submit deposits after enrollment levels have been reached will not be accepted, and their deposits will be returned.

The confirmation deposit is not credited toward tuition and fees. It is refunded when a student graduates or officially withdraws from CU-Boulder within established dates and guidelines after paying any outstanding university obligations. Students should update their direct deposit bank account information before they graduate or withdraw to be sure they receive their refund.

### Estimated Expenses

Expenses for students attending the University of Colorado at Boulder vary, depending on housing (on or off campus), program of study, state residency (tuition classification), personal needs, and individual interests.

It is difficult, therefore, to provide exact statements of total expenses. The following estimated costs per academic year were calculated for the range of full-time undergraduate students living on the Boulder campus during the 2009–10 academic year.

Tuition and fees for 2009–10 were not set when this catalog went to press. Check the Bursar's Office website for current tuition and fee rates: [www.colorado.edu/bursar/now/tuitfeebill.html](http://www.colorado.edu/bursar/now/tuitfeebill.html).

## Tuition per Semester, fall 2009 through spring 2010

(For planning purposes only. Rates for 2010–11 were not available at time of printing. Tuition charged is affected by residency status, degree, and number of credit hours. Dual degrees are charged at the higher of the two rates.)

### Undergraduate Tuition\*

#### RESIDENT Tuition

Credit Hours	A&S/Other	Business	Engineering	Journalism/Music
1	\$ (947) <b>879</b>	\$ (1,472) <b>1,404</b>	\$ (1,286) <b>1,218</b>	\$ (980) <b>912</b>
2	(1,015) <b>879</b>	(1,540) <b>1,404</b>	(1,354) <b>1,218</b>	(1,048) <b>912</b>
3	(1,083) <b>879</b>	(1,608) <b>1,404</b>	(1,422) <b>1,218</b>	(1,116) <b>912</b>
4	(1,444) <b>1,172</b>	(2,144) <b>1,872</b>	(1,896) <b>1,624</b>	(1,488) <b>1,216</b>
5	(1,805) <b>1,465</b>	(2,680) <b>2,340</b>	(2,370) <b>2,030</b>	(1,860) <b>1,520</b>
6	(2,166) <b>1,758</b>	(3,216) <b>2,808</b>	(2,844) <b>2,436</b>	(2,232) <b>1,824</b>
7	(2,527) <b>2,051</b>	(3,752) <b>3,276</b>	(3,318) <b>2,842</b>	(2,604) <b>2,128</b>
8	(2,888) <b>2,344</b>	(4,288) <b>3,744</b>	(3,792) <b>3,248</b>	(2,976) <b>2,432</b>
9	(3,249) <b>2,637</b>	(4,824) <b>4,212</b>	(4,266) <b>3,654</b>	(3,348) <b>2,736</b>
10	(3,610) <b>2,930</b>	(5,360) <b>4,680</b>	(4,740) <b>4,060</b>	(3,720) <b>3,040</b>
11	(3,971) <b>3,223</b>	(5,896) <b>5,148</b>	(5,214) <b>4,466</b>	(4,092) <b>3,344</b>
12	(4,039) <b>3,223</b>	(5,964) <b>5,148</b>	(5,282) <b>4,466</b>	(4,160) <b>3,344</b>
13	(4,107) <b>3,223</b>	(6,032) <b>5,148</b>	(5,350) <b>4,466</b>	(4,228) <b>3,344</b>
14	(4,175) <b>3,223</b>	(6,100) <b>5,148</b>	(5,418) <b>4,466</b>	(4,296) <b>3,344</b>
15	(4,243) <b>3,223</b>	(6,168) <b>5,148</b>	(5,486) <b>4,466</b>	(4,364) <b>3,344</b>
16	(4,311) <b>3,223</b>	(6,236) <b>5,148</b>	(5,554) <b>4,466</b>	(4,432) <b>3,344</b>
17	(4,379) <b>3,223</b>	(6,304) <b>5,148</b>	(5,622) <b>4,466</b>	(4,500) <b>3,344</b>
18	(4,447) <b>3,223</b>	(6,372) <b>5,148</b>	(5,690) <b>4,466</b>	(4,568) <b>3,344</b>

For credit hours over 18, add \$68 per credit hour. COF remains the same.

\* The state of Colorado provides direct funding to resident undergraduate students through the College Opportunity Fund (COF). **Students MUST apply once and authorize each semester for this funding or they will not receive it.** In the Undergraduate Tuition table above, the amount shown in **boldface** was the resident tuition for those receiving the COF voucher (\$68 per credit hour for academic year 2009–10). The amount in parentheses was the tuition for those who did not apply for the COF stipend. The COF stipend amount is subject to legislative change every year. See Colorado Opportunity Fund in this section.

#### NONRESIDENT Tuition

Group/First Enrolled	A&S/Other	Business	Engineering	Journ./Music
A/B: spring 2007 or earlier	\$11,225	\$12,650	\$11,900	\$11,350
C: summer 2007–spring 2008	11,790	13,280	12,645	11,915
D: summer 2008–spring 2009	12,700	14,300	13,620	12,830
E: summer 2009–spring 2010	13,350	15,010	14,500	13,475

### Undergraduate Fees

See pages 22–23.

### Graduate Tuition

#### Tuition Status

<b>Standard Graduate Student</b> . . . . .	<b>Grad Status A and C</b> (master's and beginning doctoral)
<b>Master's Candidate</b> courses #6940–6949 . . . . .	<b>Grad Status B</b> (defending or completing thesis)
<b>Doctoral Candidate</b> courses #8990–8999 . . . . .	<b>Grad Status D</b> (passed comps, working on dissertation)
<b>Doctoral Thesis Only</b> courses #8990–8999. . . . .	<b>Grad Status E</b> (some requirements not filled, not passed comps)
<b>Law Student</b> . . . . .	<b>Grad Status Law</b>

#### Tuition Table 1: RESIDENT Tuition, All Graduate Students

Credit Hours	A&S/Other	MBA 1st Yr.	MBA 2nd Yr.	BUSN	ENGR	JOUR/MUSC	LAW 1st Yr.	LAW 2nd Yr.	LAW 3rd Yr.
1–3	\$ 1,365	\$ 2,256	\$ 2,031	\$ 1,956	\$ 1,785	\$ 1,365	\$ 3,927	\$ 3,660	\$ 3,297
4	1,820	3,008	2,708	2,608	2,380	1,820	5,236	4,880	4,396
5	2,275	3,760	3,385	3,260	2,975	2,275	6,545	6,100	5,495
6	2,730	4,512	4,062	3,912	3,570	2,730	7,854	7,320	6,594
7	3,185	5,264	4,739	4,564	4,165	3,185	9,163	8,540	7,693
8	3,640	6,016	5,416	5,216	4,760	3,640	10,472	9,760	8,792
9+	4,095	6,768	6,093	5,868	5,355	4,095	11,781	10,980	9,891

#### Tuition Table 2: NONRESIDENT Tuition, Status A, C, E, and Law

Credit Hours	A&S/Other	MBA	BUSN	ENGR	JOUR/MUSC	LAW
1–3	\$ 3,891	\$ 4,440	\$ 4,371	\$ 4,248	\$ 3,936	\$ 5,271
4	5,188	5,920	5,828	5,664	5,248	7,028
5	6,485	7,400	7,285	7,080	6,560	8,785
6	7,782	8,880	8,742	8,496	7,872	10,542
7	9,079	10,360	10,199	9,912	9,184	12,299
8	10,376	11,840	11,656	11,328	10,496	14,056
9+	11,673	13,320	13,113	12,744	11,808	15,813

#### Tuition Table 3: NONRESIDENT Tuition, Status B and D

Credit Hours	A&S/Other	BUSN	ENGR	JOUR/MUSC
1	\$ 2,335	\$ 2,623	\$ 2,549	\$ 2,362
4	3,113	3,497	3,398	3,149
5	3,891	4,371	4,248	3,936
6	4,669	5,245	5,098	4,723
7	5,447	6,119	5,947	5,510
8	6,226	6,994	6,797	6,298
9+	7,004	7,868	7,646	7,085

### Graduate Fees

See page 22–23.

## Costs for 2009–10 Year at CU-Boulder

The figures below are estimates based on a single undergraduate student enrolled full time for an academic year of two semesters.

Expenses	Resident	Nonresident
Tuition and Fees	\$7,932–\$11,782	\$28,186–\$31,506
On-campus Room and Board (based on double occupancy)	10,378	10,378
Books and Supplies	1,749	1,749
<b>On-campus Est. Total</b>	<b>\$20,059–\$23,909</b>	<b>\$40,313–\$43,633</b>

### Notes

1. Residency classification is determined by Colorado state law. The resident tuition amount assumes eligibility for, and authorization for the use of, the College Opportunity Fund (COF) stipend, which was \$68 per credit hour in 2009–10.
2. Special residential academic fees, program fees, course fees, and transportation, medical, and personal cost estimates are not included in the estimated total because costs can vary depending upon individual circumstances and spending habits.

Students planning to attend summer session should take into account estimated expenses indicated in the *Summer Session Catalog*, available online and from the Office of the Registrar in mid-February.

Resident tuition is charged per credit hour. Nonresident tuition is a flat rate, regardless of the number of credit hours.

Resident undergraduate students must apply once, and authorize every semester, for the College Opportunity Fund tuition voucher program to help offset part of their tuition. See [www.cu.edu/ums/cof/faq.html](http://www.cu.edu/ums/cof/faq.html) and [cof.college-assist.org](http://cof.college-assist.org) for additional information.

Nonresident students are guaranteed the same tuition rate for four years. Students first registering summer 2010 through spring 2011 are guaranteed the same tuition rate through summer 2014. See [www.colorado.edu/pba/budget/tuitionfees/guarantee.html](http://www.colorado.edu/pba/budget/tuitionfees/guarantee.html) for more information.

Zero or fractional credit is treated as one hour in assessing tuition and fees. Tuition for no-credit (NC) courses is the same as for courses taken for credit.

Students simultaneously enrolled in programs leading to two different degrees will be assessed tuition for the college or school with the higher tuition rate.

## Housing Security Deposit

All students who live in the residence halls are required to pay a one-time security deposit of \$300 (deposit is subject to change). This security deposit is held by Housing & Dining Services and is released to the tuition and fee account within 60 days after the expiration of the housing contract.

The security deposit required for housing is in addition to the confirmation deposit required for admission to the university.

## Fees

### New Student Fee

The new student fee is a one-time nonrefundable fee assessed at the time of initial registration for students entering a degree program. Nondegree students who are admitted to degree status are charged the new student fee at the time they first register. It covers expenses for registration and transcripts, undergraduate orientation, Buff OneCard, immunization management, Forever Buffs alumni membership, and orientation for international students. The fee varies depending upon degree and international status.

Undergraduate students	\$182
Graduate students	\$62

International undergraduate students	\$225
International graduate students	\$105

## Program and Course Fees

Instructional fees are charged on an individual basis to help offset the higher costs of specialized supplies and equipment unique to these programs and courses. Program and course fees for 2009–10 ranged from \$5–\$15 per credit hour, \$5–\$390 per course, and \$23–\$297 per semester. Visit [www.colorado.edu/bursar](http://www.colorado.edu/bursar) for a list of specific program and course fees. Lab courses not linked to a lecture course may also require payment of a course fee. In addition, certain colleges charge a fee for enrollment in that college, even if the student is not currently taking courses that apply to their major.

## Late Registration Fee

A late registration fee may be charged to students who are authorized to register for a fall or spring semester (but who are not registered in any classes by the third Friday of the semester). The late registration fee is \$100. This fee should not be confused with late and service charges assessed for late payments.

## Golden Buffalo Student Health Plans

CU-Boulder has a mandatory policy statement requiring all students taking 1 or more credit hours to be covered by a health insurance plan. Students may have health insurance coverage from their employers, their own insurance plans, their parents' plans, or the university-sponsored student health insurance.

The university automatically charges all students for the university-sponsored student health insurance. A student must take positive action to waive this insurance coverage. The deadline to submit an insurance waiver is September 1, 2010, for fall and January 19, 2011, for spring. The student health plan selected for fall automatically extends through spring/summer 2011 unless another plan is selected. Students are enrolled and billed each semester.

Enrollment is not automatic for spouse/domestic partner and dependents; or for continuing education, Study Abroad programs (including Semester at Sea), Time Off, and evening MBA students.

The university is not responsible for a student's health care costs. If a student participates in one of the student health plans offered, Wardenburg Health Center will provide covered services as set forth within the plan selected.

For more information about the university-sponsored student health plans, go to [www.colorado.edu/studenthealthplans](http://www.colorado.edu/studenthealthplans), call 303-492-5107, or stop by the student health plans office located in Wardenburg Health Center 336.

## 2009–10 Mandatory Fees per Semester

### Activity Fee (assessed by UCSU)<sup>1</sup>

One class of 5 or fewer credit hours, without health insurance	\$59.64
One class of more than 5 credit hours or any credits with insurance	\$349.32
More than one class (any amount of credit hours)	\$349.32
Note: Graduate status of "D" fees only (with insurance)	\$122.31

### Arts and Cultural Enrichment Fee

All students	\$10.00
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### Athletic Fee<sup>2</sup>

Credit hours of 3 or fewer	\$0.00
Credit hours of 4 or more	\$28.50

### Capital Construction Fee

Credit hours of 6 or fewer	\$100.00
Credit hours of 7 or more	200.00

**Career Services Fee**

All students except law and doctoral candidates . . . . . \$9.00

**Computing Fee**

Credit hours of 6 or fewer . . . . . \$33.62  
Credit hours of 7 or more . . . . . 67.24

**Health Insurance**

Student Gold health plan is mandatory (but may be waived if proof of other insurance is shown). Plans are Student Gold (\$1,052.50) or Wardenburg Campus Care (\$165, supplemental to other insurance).

**International Student Processing Fee (SEVIS)**

(international students only) . . . . . \$22

**Student Bus and Bike Programs Fee<sup>3</sup>**

All students . . . . . \$72.00

**Student Information System (SIS) fee**

Mandatory for all students . . . . . \$7.00

<sup>1</sup> Payment of full student activity fee of \$342.42 is mandatory unless enrolled in only one class of 5 or fewer credit hours, in which case base fees of \$59.64 are charged. If student is eligible for base fees and is covered by Golden Buff Health Insurance plan, they must also pay the Wardenburg portion of student fees in the amount of \$62.67. For additional information, call the Bursars Office at 303-492-5381 or e-mail [bursar@colorado.edu](mailto:bursar@colorado.edu).

<sup>2</sup> Not assessed to doctoral candidate or doctoral thesis.

<sup>3</sup> The student bus and bike program fee entitles students to unlimited free rides on local, regional, and express bus routes.

**Additional Graduate Student Fees**

Law Students are assessed two additional fees:

Graduation Fee . . . . . \$30  
Law Student Services Fee . . . . . \$150  
UGGS Graduate Fee . . . . . \$4.50

For detailed student fee information, visit [www.colorado.edu/bursar](http://www.colorado.edu/bursar).

**Tuition and Fee Regulations****Drop/Add Tuition Adjustment**

Adjustment of tuition and fees is made on drop/add changes as published at [registrar.colorado.edu](http://registrar.colorado.edu).

**Tuition Classification**

Students are classified as residents or nonresidents for tuition purposes on the basis of answers provided on their application for admission and other relevant information. For more information, go to the tuition classification link at [registrar.colorado.edu/students/tuition\\_classification.html](http://registrar.colorado.edu/students/tuition_classification.html).

**Students Registered on More Than One Campus**

Students registering for courses on more than one campus of the university during a single term pay tuition and fees to each campus at the rate appropriate to the number of credits for which they are registered on that campus. Students may be eligible to use the concurrent registration option, in which case they pay the tuition rate of their home campus rates for the total hours enrolled at all campuses.

**Nondegree Students**

Nondegree students enrolled in undergraduate courses are assessed tuition at the undergraduate student rate. Nondegree students enrolled in graduate courses are assessed tuition at the graduate student rate. Nondegree students enrolled in both graduate and undergraduate courses are assessed tuition at the undergraduate student rate.

**University Employees**

Any permanent employee may enroll for no more than 9 free semester hours of credit (and some permanent part-time employee for a proportionate number of credit hours) in any academic

year (summer, fall, spring) on a space-available basis beginning the day before classes begin. Courses need to be job related or career enhancing. (Courses offered through Continuing Education are not eligible. It is the employee's responsibility to determine if a course is a Continuing Education class.) Time taken to attend classes during normal working hours shall be made up and shall be limited to one course during any term. Persons appointed for less than full time are not eligible for release time during assigned hours. For details, visit the tuition benefit link at [www.colorado.edu/bursar](http://www.colorado.edu/bursar).

**Concurrent Bachelor's/Master's Degree Programs**

The Graduate School, in cooperation with the other colleges and schools, has instituted a concurrent bachelor's/master's degree option.

Students need to talk with specific departments regarding programs offered and verification of the following statements:

1. Students who complete the requirements for the concurrent bachelor's/master's degree receive both degrees simultaneously.
2. Students admitted to concurrent programs may register for graduate courses before they receive a bachelor's degree.
3. Students admitted to bachelor's/master's programs will pay tuition according to their graduate/undergraduate status throughout the five to six years required to complete the concurrent bachelor's/master's degrees.
4. Students admitted to concurrent degree programs will be regarded as undergraduate students for the purposes of receiving financial aid throughout the five years of their program, unless they are advanced to graduate status. Students may advance to graduate status upon the recommendation of their department, only after the completion of all their undergraduate requirements.

**Approved Doctoral Candidates**

A student who has passed the comprehensive exam and is admitted as an approved doctoral candidate is registered for five dissertation hours. Students not making use of campus facilities may choose to register for three dissertation hours and will be considered part-time students. Continuous registration for appropriate dissertation hours during fall and spring semesters is required until completion of the dissertation defense. During the semester of the dissertation defense, a student must be a full-time student, registered for five dissertation hours. A DMA student who has passed the comprehensive exam must maintain continuous registration by registering for DMA dissertation credits (courses 8200–8399) or TMUS 8029 through the semester in which the final dissertation exam or final exam is completed.

**Payment of Tuition and Fees****University Bills**

Any student who completes registration agrees to pay CU-Boulder according to the payment terms documented at [www.colorado.edu/bursar](http://www.colorado.edu/bursar) under the tuition and fees section. The bill includes tuition, fees, university residence hall charges, financial aid awards, student loan proceeds, research and teaching assistant tuition waivers, and other credits to tuition and fees. An e-mail notification is sent to the student's CU e-mail address when the bill is available online. A student may also authorize parents and others (up to five people) to view and pay the bill online at [CUBill&Pay](http://CUBill&Pay).



Payment methods include:

- Online payment from checking or savings account: see **MyCUInfo.colorado.edu** or **www.colorado.edu/bursar**.
- Cash
- Check (personal, certified, cashier's, traveler's, credit card checks, or money orders). Include student's identification number on the check.

*Credit and debit cards are not accepted, due to the high cost of merchant fees.*

Payment can be delivered via the Internet, wire, overnight express, standard U.S. Postal Service, or dropped in one of two payment drop boxes located outside the north and south entrances of Regent Administrative Center. (See detailed information for all payment options at **www.colorado.edu/bursar**.)

Failure to receive the official e-mail notification of the bill does not relieve any student of responsibility for payment by the published deadline. To avoid assessment of service charges (1 percent per month on the unpaid balance), a late fee (up to \$50 per semester), and possible loss of future semester classes, tuition and fees must be paid by the deadline published at **www.colorado.edu/bursar**. Subsequent bills will reflect adjustments and additional charges made throughout the semester. Tuition and fee billing information is available at **www.colorado.edu/bursar**.

### Two-Payment Plan

Students may select a two-payment plan online by the first tuition payment deadline each semester. For more information about the two-payment plan, visit **www.colorado.edu/bursar**.

### Failure to Make Payment

Failure to make the required payment by the stated deadline will result in any or all of the following actions:

1. Registration for future terms will not be allowed. If the student is already registered for courses for a future term, those courses may be dropped.
2. No transcripts, diplomas, or certification materials are issued for the student until the bill is paid in full.
3. The student will still be responsible for full tuition and fees, as well as a service charge (1 percent per month on the unpaid balance) and a late charge per semester according to the following schedule:

<i>Balance Due</i>	<i>Late Charge</i>
\$1.00–99.99	\$ 5.00
\$100.00–299.99	\$10.00
\$300.00–499.99	\$20.00
\$500.00–699.99	\$30.00
\$700.00–899.99	\$40.00
\$900.00 and over	\$50.00

4. All past due accounts are referred to the university's Student Debt Management Department for collection, where collection costs may be assessed.
5. If an account is referred to a third-party collection agency, the delinquency may be reported to national credit bureaus and the student must pay collection costs and attorney fees allowed by the Uniform Consumer Credit Code. For more information, see **www.colorado.edu/bursar**.

### Returned Payment Policy

A \$20 fee is assessed for all payments returned (regardless of the amount). Late and service charges may be assessed and certified

funds may be required when payment is made. A stop will be placed on the student's record and students may also be liable for the collection costs, attorney fees, and prosecution under the Colorado Criminal Statutes. Specific inquiries regarding returned payments should be directed to the Student Debt Management department in the Bursar's Office.

### Dispute Rights

To dispute tuition and mandatory fee charges, you must make a formal appeal to the Tuition Dispute Committee by the end of the semester (last day of finals). Disputes will only be considered under extenuating circumstances, such as university error, recent medical condition, immediate family emergency, recent unanticipated financial problems, and verified non-attendance. Official documentation must be provided to substantiate the circumstances. You may obtain a dispute form at **www.colorado.edu/bursar/info/dispute.html** or by contacting the Bursar's Office Student Billing Department, Regent Administrative Center, 43 UCB, Boulder, CO 80309-0043, **303-492-5381**, or **bursar@colorado.edu**. If you disagree with the charges and fail to avail yourself of the dispute process by the end of the semester, you will have been deemed to have waived your right to dispute the charges. For additional information on the dispute process, go to **www.colorado.edu/bursar**.

### Withdrawal Policy Regarding Tuition and Fees

Students who pay the \$200 confirmation deposit and register for classes for any given semester are obligated to pay full tuition and fees for that semester, unless they officially withdraw from the university.

Tuition and fee obligations for withdrawing students are as follows (for fall and spring semesters):

1. **Continuing students:** If withdrawal is by the "deadline to withdraw and not be assessed a financial penalty," continuing students and students returning from the Time Off Program receive a refund of the confirmation deposit less any outstanding charges.
  - New and readmitted students:** New, readmitted, and transfer students are not eligible for a refund of the confirmation deposit.

Deadlines to withdraw with no financial penalty vary by semester but occur some time before the first day of instruction. Visit **registrar.colorado.edu** for specific dates.

If students withdraw after the "deadline to withdraw and not be assessed a financial penalty" but before 5:00 P.M. on the third Wednesday of instruction, they are assessed a \$200 withdrawal processing fee. (The confirmation deposit is applied to this charge.)

2. No refunds will be made for students who withdraw after the third Wednesday of instruction. However, students who feel they have circumstances that may warrant a tuition adjustment and who withdraw after the third Wednesday of instruction through the fifth Wednesday of instruction, may petition the Bursar's Office to be assessed 40 percent of total tuition (not including the portion of tuition paid by COF for in-state undergraduate students) and mandatory fees (UCSU student fees, athletic fee, and capital construction fee). Students who withdraw after the fifth Wednesday of instruction through the seventh Wednesday of instruction may petition to be assessed 60 percent of total tuition (not including the portion of tuition paid by COF for in-state

undergraduate students) and mandatory fees (UCSU student fees, athletic fee, and capital construction fee). After the seventh Wednesday of instruction students may not petition for any tuition adjustment unless there are extenuating circumstances (university error, recent medical condition, immediate family emergency, recent unanticipated financial problems, verification of non-attendance). College Opportunity Fund hours are expended and not refunded with withdrawals after the published deadline.

To comply with federal financial aid regulations, financial aid recipients' loan and scholarship awards may be adjusted.

Students should visit [registrar.colorado.edu](http://registrar.colorado.edu) for any changes, as the Board of Regents reserves the right to revise this schedule at any time. Refer to the *Summer Session Catalog* for information on the withdrawal policy and refund schedule for summer terms.

It is the responsibility of students to have all special services fees removed at the time of withdrawal. Otherwise, these fees become a financial obligation.

Students who do not pay the full amount due the university at the time of withdrawal must make arrangements for payment with the Student Debt Management department in the Bursar's Office. All withdrawals are handled through the Office of the Registrar, Regent Administrative Center 105.

## Auditing

Individuals who wish to attend regularly scheduled classes and who are not registered students must obtain auditor's status. Auditors, resident or nonresident, pay resident arts and sciences undergraduate tuition for 3 credit hours per term and receive class instruction and library privileges only. An auditor's card must be presented to the instructor on the first day of class. An auditor must get permission from the instructor to audit the class prior to purchasing the audit card. Audit cards are not refundable and expire at the end of the semester in which classes are taken. Cards may be obtained from the Bursar's Office in Regent Administrative Center no earlier than one week before classes start and no later than the deadline to drop/add.

To qualify as an auditor, an individual must be 18 years of age or older and not a registered student. Anyone under suspension from the university may not audit courses. Auditors may attend as many courses as they wish (except those courses with laboratories or where equipment is used), with instructor permission.

If a regular degree student wishes to participate in a class without receiving credit, the student must register for the course for no credit. Tuition for courses taken for no credit is the same as for courses taken for credit. Auditors should note that the Office of the Registrar does not keep any record of courses audited; therefore, credit for these courses cannot be established.

Those 55 and older qualify for the Senior Audit Program's much reduced audit rates and should contact the CU Alumni Association at 303-492-8484, [cualum.org/services/senior-auditors](http://cualum.org/services/senior-auditors).

## Financial Aid

The Office of Financial Aid's primary goal is to ensure that students who have been admitted to the university will have access to the resources necessary to complete their education. Approximately 88 percent of CU-Boulder students receive financial aid each year from federal, state, university, and private sources. Total aid for graduates and undergraduates is over \$230 million and is a combination of loans, work-study, grants, and scholarships.

## Applying for Financial Aid

Students apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA) at [www.fafsa.ed.gov](http://www.fafsa.ed.gov). Based on a federal formula, the FAFSA determines a student's eligibility for need-based and non-need-based financial aid, as well as some scholarships. Students must reapply for financial aid every year.

For financial aid for fall 2010, spring 2011, and summer 2011, the 2010-11 FAFSA must be submitted. Students should apply as soon as possible after January 1, 2010.

After submitting the FAFSA, applicants receive a Student Aid Report (SAR) from the federal processor. The Office of Financial Aid receives the SAR results electronically if CU-Boulder is listed on the application.

Students must be admitted to the university before their financial aid application can be considered. However, prospective students do not need to wait for formal acceptance to CU-Boulder before applying for financial aid or scholarships.

## Eligibility

Eligibility for financial aid is based on the cost of attending CU-Boulder and the amount students and their families are expected to contribute toward the cost of attendance. Each year the financial aid office calculates the cost of attendance using local and national cost-of-living data.

The expected family contribution (EFC) is determined by an analysis of the student's FAFSA. A student's financial need is calculated by subtracting the EFC from the cost of attendance.

The financial aid award is funded from a combination of need-based and non-need-based financial aid sources in an effort to meet each applicant's total financial eligibility. Students may need to borrow educational loans and work part-time while they are in school.

## Financial Aid Awards

Most financial aid is awarded in April, but aid is offered as long as funds are available. Freshman and transfer students applying for aid for the 2010-11 academic year are encouraged to submit their FAFSA applications by April 1, 2010, in order to receive aid information in time to make an informed decision. Awards available to CU-Boulder students are listed below.

### Loans

Students submit the FAFSA to be considered for the following loan programs.

**Federal Direct Stafford Loan.** Funds are awarded and disbursed by CU-Boulder. Students sign a promissory note for the loans, which have two fixed interest rates of 5.6 percent (subsidized) and 6.8 (unsubsidized). Annual limits depend on the year in school: freshmen can be awarded up to \$3,500; sophomores, \$4,500; juniors and seniors, \$5,500; and graduate students, up to \$8,500. The loan may be need-based and subsidized (interest does not accrue while borrowers are in school) or non-need-based, which are unsubsidized. Beginning in the 2008-09 academic year, undergraduates may borrow an additional \$2,000 unsubsidized loan on top of their yearly limit as noted above. The interest on non-need-based loans may be paid while in school or borrowers can choose to have it deferred. Repayment begins six months after the student graduates or ceases to be enrolled at least half time (6 credit hours).

**Federal PLUS Loan.** This federal loan is available to graduate students and parents of dependent undergraduate students. The interest rate is fixed at 7.9 percent for loans disbursed on or after July 1, 2006. Repayment begins within 60 days of full disburse-

ment of the loan. Typically, repayment begins in March for an academic year loan; however parents may now request a deferment on payments until their student has finished with school. Borrowers must complete a credit check. **NOTE:** Borrowing a PLUS loan will be regarded as parental support on in-state residency petitions for dependent students.

**Federal Direct Stafford Loan—Additional Unsubsidized.** This federal loan program is for independent students as defined by federal guidelines. The interest on this loan may be paid while in school or borrowers can choose to have it deferred. The deferred interest is capitalized at the time repayment begins. Repayment begins six months after the student graduates or ceases to be enrolled at least half time (6 credit hours). Loan limits are determined by year in school: freshmen and sophomores, up to \$4,000 per year; juniors and seniors, up to \$5,000 per year; graduate students, up to \$12,000 per year.

### Work-Study

Students submit the FAFSA to be considered for need-based work-study. Work-study students earn their award by working for on-campus or approved off-campus agencies. Students may apply for a variety of jobs at competitive rates. Jobs can be found online through the portal for students. Students who are not awarded work-study may call **303-492-7349** to have their name added to the work-study waitlist.

### Grants

Grants are awards that do not have to be repaid. Students submit the FAFSA to be considered for federal, state, and institutional need-based grants (including Pell, SEOG, Colorado Student Grant, etc.).

### CU-Boulder Scholarships

Students may apply for scholarships offered by the Office of Financial Aid online at [MyCUBoulder.colorado.edu](http://MyCUBoulder.colorado.edu) beginning November 1 each year. To apply for scholarships that have a financial need requirement, results of your FAFSA must be on file in the financial aid office no later than the first business day in March. *Note: This is earlier than the financial aid priority deadline of April 1.*

Scholarships are highly competitive at CU-Boulder. The selection committee considers academic achievement, honors, leadership, school activities, and service to the community. Students should also search for scholarship opportunities within their academic program, college, club, or campus organization.

### Private External Scholarships

Students who receive a private scholarship from an organization outside the university must notify Scholarship Services in the Office of Financial Aid. In addition, students are encouraged to write to their donors and express their gratitude.

When a scholarship donor does not specify how to disburse the funds, the financial aid office equally divides awards of \$1,000 or more between the fall and spring semesters. Private scholarships less than \$1,000 are applied in full to the current semester bill.

Donors should mail their checks, payable to the University of Colorado, with a cover letter to:

University of Colorado at Boulder  
Office of Financial Aid  
ATTN: Scholarship Services  
77 UCB  
Boulder, CO 80309-0077

If a student's scholarship check is not received by the bill payment deadline, he or she should make other arrangements to pay the bill.

### Other Conditions

Most financial aid and scholarships require students to be enrolled full time (12 credit hours or more for undergraduates). Students who intend to enroll less than full time should notify the Office of Financial Aid to have their aid adjusted.

### Drug Conviction

In accordance with the Higher Education Reconciliation Act of 2005, students who have been convicted under federal or state law for possession or sale of a controlled substance will be suspended from Title IV aid eligibility if the offense occurred while the student was receiving Title IV aid.

If a student is convicted for possession, the ineligibility period begins as of the date of the conviction and is:

- first offense = one year
- second offense = two years
- third offense = indefinite

If a student is convicted for sale of an illegal substance, the ineligibility period begins as of the date of the conviction and is:

- first offense = two years
- second offense = indefinite

A student may regain eligibility by successfully completing a drug rehabilitation program that complies with criteria established by the Department of Education. More information is available by calling the U.S. Department of Education at **1-800-433-3243**.

### Satisfactory Academic Progress

Students who apply for financial aid at CU-Boulder are responsible for knowing and complying with the satisfactory academic progress policy. Briefly, the policy requires students to maintain a 2.000 grade point average (GPA) and complete at least 67 percent of the hours they attempt. Students are also limited to a maximum number of credit hours (generally 180 hours for a bachelor's degree) they can attempt.

### Study Abroad

Students must be enrolled in a CU-Boulder study abroad program to be eligible for financial aid through CU-Boulder's financial aid office. Students participating in a study abroad program through another university are not eligible for financial aid from CU-Boulder.

### Withdrawing

If a student enrolls at CU-Boulder, receives financial aid, then withdraws, his or her financial aid is adjusted according to federal regulations. The student may owe a refund to the university after the financial aid is adjusted. Visit [www.colorado.edu/finaid/maintaining.html#withdrawing](http://www.colorado.edu/finaid/maintaining.html#withdrawing) for more information.

### Other Resources

#### Student Employment

Jobs provide students with income, work experience, and the opportunity to explore career options. Research studies indicate that students who work are as successful academically as those who do not. Freshmen usually work 8–15 hours per week. The Student Employment Office posts an average of 800 part-time

on-campus and off-campus jobs for students. In addition, an on-call temporary employment service allows students to register for occasional work including one-time child care, yardwork, and clerical jobs.

Visit the Student Employment Office in Regent Administrative Center 205 or call **303-492-7349** for more information.

### *Student Work Assistance Program (SWAP)*

This program gives students who are living in the residence halls a credit against their housing bill in exchange for hours worked in one of the dining centers. More information is available at **303-492-6325** or **SWAP@housing.colorado.edu**.

## Housing

### Residence Halls

Living on campus in a university residence hall is considered an important part of student life. Almost 6,100 students are accommodated in single rooms, double rooms, multiple occupancy rooms, and apartments in 22 residence halls. All halls are coeducational, but in the majority of cases, specific wings and floors house occupants of the same gender.

Each fall the residence halls provide a new home for over 5,300 entering freshmen. Subject to the availability of space, all freshmen are required to live in a residence hall for two academic semesters (a summer term does not count as an academic semester), unless they are married or live with parents and have permission to commute. Requests for permission to reside off campus for other reasons are considered on their merits, taking into account individual circumstances.

Freshmen who apply by mid-May can usually get housing for the following fall term. Due to heavy demand for limited space, however, freshmen applying for housing after mid-May may not find residence hall space available for the fall. If this is the case, freshmen will be given information regarding wait lists and/or assistance in finding off-campus housing.

The residence halls provide a range of services and programs designed to support the intellectual, social, and personal growth of single student residents. All residence halls, for example, offer tutoring services to residents at no cost. Some halls offer special facilities, such as an academic skills lab, or a music room. A variety of academic and social programs are sponsored by residence hall and other university staff.

The residence hall dining service hours are planned to be convenient for most students' schedules, and self-serve salad bars are available at noon and evening meals. Steak nights, ice cream socials, and late-night coffee and cookie breaks during exam week are among the special activities planned during the semester. The dining program permits students (regardless of hall assignment) to eat in any residence hall dining room.

For more information about university housing options and/or permission to reside off campus, prospective students may write to Occupancy Management, 75 Hallett Hall, 154 UCB, Boulder, CO 80309-0154.

### *Residential Academic Programs*

A number of the residence halls are home to residential academic programs (RAPs), whereby students live in and take special classes in their hall that meet core curriculum and/or other course requirements. These special academic programs are described in the College of Arts and Sciences and Other Academic Programs sections. Most of these programs charge additional fees. They include:

- **The Baker Residential Academic Program** is designed for freshmen and sophomores in the College of Arts and Sciences interested in the natural sciences and environmental studies.
- **The Engineering Honors Program** in Andrews Hall includes enhanced course work, access to industry leaders, mentoring relationships, and participation in a community of engineering honors students.
- **The Farrand Residential Academic Program** offers 400 first- and second-year students in the College of Arts and Sciences the opportunity to enjoy the benefits of a small liberal arts college while taking advantage of the resources of a large university.
- **The Global Studies Residential Academic Program** at Cheyenne Arapaho Hall was created to promote international understanding and the recognition of global interdependencies.
- **The Honors Residential Academic Program** (or HRAP; formerly known as the Kittredge Honors Program, or KHP) is the residential component of the Honors Program of the College of Arts and Sciences. It is open to approximately 200 Honors-qualified first- and second-year students. Participants live in Arnett Hall.
- **The Leadership Program at Williams Village**, is dedicated to the development of community and professional leaders among students from all schools and colleges on the Boulder campus. The Leadership RAP offers two academic tracks: the Ethnic Living and Learning Community Leadership Studies Program (ELLC) and the Chancellor's Leadership Studies Program (CLSP). Some scholarships to cover the program fee are available for those in need.
- **The Libby Arts Residential Academic Program (LRAP)** is designed primarily for first- and second-year College of Arts and Sciences and Leeds School of Business students interested in the arts. LRAP offers a curriculum in the arts, including visual arts, theatre and dance, film studies, and music. In addition to small class sizes in a living and learning environment, co-curricular activities provide a sense of community and a unique opportunity to interact with faculty and LRAP advisors across art disciplines.
- **The Sewall Residential Program** is limited to approximately 330 first-year students in the College of Arts and Sciences who are interested in the study of history and culture.

### *Living and Learning Communities*

Living and Learning Communities also enhance the learning environment. Several communities offer themed housing without the formal connection to faculty found with the RAPs.

- **The B<sup>3</sup> Business Living and Learning Community** is limited to approximately 90 first-year students enrolled in the Leeds School of Business. The community participants work together on their areas of expertise within the business curriculum and enjoy close access to advisors and faculty.
- **The Hallett Diversity Program** was created to encourage students to learn about differences and to celebrate them. It provides leadership opportunities and an environment for acquiring awareness of one's own and others' culture and values.
- **The Quadrangle Engineering and Sciences Living and Learning Community** is comprised of students studying engineering and natural science who live in Aden, Brackett, Cockerell, or Crosman halls. This program offers residents specialized tutoring, extensive computer system access, and professional

counseling and advising. An additional fee of \$130 per academic year was charged in 2009–10 to cover support activities (fee is subject to change).

- **Spectrum**, part of the Hallett Diversity Program, offers a variety of social and educational activities including leadership opportunities. Spectrum is designed to provide a supportive place for individuals of all sexual identities including gay, lesbian, bisexual, transgender, and queer people and their allies. The Spectrum living area has gender neutral bathrooms.

### *Other Academic Programs in the Residence Halls*

The Community on Academic Programs in the Residence Halls (CAPRH) develops academic programs in CU-Boulder's residence halls. Funded projects include a faculty luncheon program in the halls, informal activities that promote out-of-the-classroom interaction between faculty and students, and special arts and sciences core curriculum courses presented directly in the halls. All programs facilitate greater interaction between faculty and students, and foster the integration of students' academic life with their campus residence hall life. Interested students, faculty, and staff are encouraged to participate in the planning and submission of projects to the council.

### *Room and Board Rates per Semester*

Residence hall room and board rates per person, per semester, for the 2009–10 academic year were as follows:

19 meals/week and double room	\$5,189
19 meals/week and single room	\$5,980

Different meal plans are available. A modest rate increase should be expected for the 2010–11 year.

### *Application for Residence Hall Housing*

New freshman and transfer students receive information from Housing & Dining Services about applying for accommodations after they have confirmed their intent to attend the university. Housing assignments are made on a first-come, first-served basis. The earlier applications are submitted, the better chance students have of being assigned to the residence hall of their choice. (Please note that Housing & Dining Services does not guarantee assignment to a particular building or program, type of accommodation, or a specific roommate.)

Space for the fall term can normally be assured for all freshmen who apply for housing by mid-May. However, due to heavy demand for limited hall space, the university cannot always guarantee that freshmen who apply for housing late (usually after mid-May for the fall term) will find space available in the residence halls. If this is the case, students are so advised and are given appropriate instructions regarding wait lists and/or assistance in securing off-campus housing.

*Note: Application for admission to the university and application for housing are two separate transactions. Application for housing does not guarantee admission to the university, nor does admission to the university guarantee that housing will be available. For information regarding admission notification and confirmation procedures, see the Undergraduate Admission section.*

A security deposit (\$300 for 2009–10) is required to apply for residence hall accommodations. (Deposit is subject to change.)

All housing contracts are for the full two-semester academic year or remainder thereof. An early termination of contract is subject to financial penalties as stated in the residence halls contract.

## Family Housing

The university offers studio, one-, two-, and three-bedroom furnished and unfurnished apartments for student, staff, and faculty families. The university's Children's Center provides day care for the children of family housing residents, staff, and faculty. For information on applying to family housing, write the Family Housing Office, 1350 20th Street, University of Colorado at Boulder, Boulder, CO 80302, call **303-492-6384**, or e-mail [familyhousing@housing.colorado.edu](mailto:familyhousing@housing.colorado.edu). The housing website is [housing.colorado.edu](http://housing.colorado.edu).

## Off-Campus Student Services

Off-Campus Student Services (a service of UCSU) maintains listings of apartments, houses, and rooms for rent in the Boulder community. Currently enrolled students may view these listings online at [www.colorado.edu/ocss](http://www.colorado.edu/ocss). The office also maintains a detailed list of apartments in the Boulder area. This is available for pickup in the office.

The department has a staff attorney available to advise students about leases, security deposits, and ways to avoid landlord/tenant problems. Office assistants will help students locate properties and answer questions about the surrounding neighborhoods. During the spring semester, the office sponsors two off-campus housing fairs where landlords, property managers, and related businesses offer their services to students in a trade-show fashion.

Others who are affiliated with the university may request information but will be charged \$12 (within the United States) or \$20 (outside the United States). Checks should be made out to the University of Colorado. The packet will include a 30-day Web access code to housing listings, an apartment complex summary, a Boulder map, and other information pertinent to living and renting in Boulder.

For additional information, call **303-492-7053** or write Off-Campus Student Services, University of Colorado at Boulder, 206 UCB, Boulder, CO 80309-0206. Office hours are 9:00 A.M.–5:00 P.M., Monday–Friday. Summer hours are 7:30 A.M.–4:30 P.M.

## Registration

Students should refer to the academic calendar on the registrar's website ([registrar.colorado.edu](http://registrar.colorado.edu)) for specific dates and deadlines that apply to the registration process. Students should also consult individual college and school sections of this catalog and their dean's office for additional information on special requirements and procedures. The following registration policies are intended to serve as general guidelines.

Registration generally involves three steps: registering for courses, obtaining a bill before classes begin, and dropping and adding classes during drop/add periods, if needed.

Students who require accommodations because of a disability should notify the Office of the Registrar, University of Colorado at Boulder, 20 UCB, Boulder, CO, 80309-0020, or call **303-492-6970**.

## Confirmation Deposit

All degree students pay a one-time-only \$200 confirmation deposit that allows them to enroll without paying a registration deposit each term.

Confirmation deposits are refunded to students upon graduation or official withdrawal from CU-Boulder within established dates and guidelines. All refunds are reduced by any outstand-

ing financial obligations. Interest earned from confirmation deposits is used for student financial aid.

The \$200 deposit is required of all degree students. New students are required to pay the deposit when they first confirm their intent to enroll at CU-Boulder and are not permitted to register until the confirmation deposit is paid.

All questions regarding the confirmation deposit policy should be directed to the Office of the Registrar, Regent Administrative Center 105, 303-492-6970.

## Registering for Courses

All CU-Boulder students register for courses via the student portal, [MyCUInfo.colorado.edu](http://MyCUInfo.colorado.edu).

Registration information is sent to new freshmen as well as new transfer, new graduate, and readmitted students when they have confirmed their intent to enroll, with the exception of new freshmen and transfer students in arts and sciences, who receive their registration information at orientation. Continuing students are notified each semester of times, places, and requirements for registration.

## Bill Distribution

Bills are online on CUBill&Pay before each semester begins, depending on when students have registered. Bill distribution information appears online at [www.colorado.edu/bursar](http://www.colorado.edu/bursar) and in the Summer Session Catalog. Students access their online bill on [MyCUInfo.colorado.edu](http://MyCUInfo.colorado.edu).

## Drop/Add

Students can adjust their schedules by dropping and adding classes via the student portal, [MyCUInfo.colorado.edu](http://MyCUInfo.colorado.edu). For fall and spring semesters, drop/add activity takes place by time assignment during the Friday prior to the first day of the semester. After that, the system is available to all students through the drop and add deadlines.

For more information, visit the registrar's website at [registrar.colorado.edu](http://registrar.colorado.edu).

## Drop/Add Deadlines

Specific drop and add deadlines for each fall and spring semester are listed on the registrar's website at [registrar.colorado.edu](http://registrar.colorado.edu). Summer deadlines appear in the *Summer Session Catalog*.

1. Students are allowed to add courses through the add deadline with no authorization signatures required (second Wednesday of instruction in the fall or spring semester; the deadline varies in the summer). After the add deadline in fall and spring semesters, the instructor's approval is required to add a course through the "deadline to add a course without petitioning the dean" (third Friday of instruction), unless enrollment levels are reached earlier. Courses cannot be added after this deadline. In summer, courses cannot be added after the add deadline.
2. Students can drop courses through the drop deadline with no authorization signatures required (third Wednesday of instruction in the fall or spring semester; the deadline varies in the summer). Tuition and fees are not assessed for courses dropped by this deadline. After the drop deadline, the instructor's signature is required to drop a course through the "deadline to drop a course without petitioning the dean." The signature indicates that the student is passing the course; students who are failing their courses are not permitted to drop. Courses dropped after the drop deadline appear on the transcript with a *W* grade and no tuition adjustment is made.

3. After the "deadline to drop a course without petitioning the dean" (six weeks after classes begin in the fall or spring semester; the deadline varies in the summer), courses may not be dropped unless there are documented circumstances clearly beyond the student's control (e.g., accident or illness). In addition to obtaining the instructor's signature, students must petition their dean's office for approval to drop the course. Petitions normally are not approved after this date.
4. Students dropping all of their courses should refer to the Withdrawal Procedures section for more information.

## Credit/No Credit

Students who wish to take course work for no credit should indicate this at the time they register for courses or during the final drop/add period; changes in credit registration are not permitted after the drop/add deadline in the summer or after the third Friday of the semester in the fall and spring. Tuition is the same whether or not credit is received in a course.

## Pass/Fail (P/F)

Students should refer to the college and school sections of this catalog to determine the number of *pass/fail* credit hours that may be taken in a given semester or credited toward a bachelor's degree. Exceptions to the *pass/fail* regulations are permitted for certain courses that are offered only on a *pass/fail* basis. Procedures for requesting *pass/fail* enrollment can be found on the registrar's website at [registrar.colorado.edu](http://registrar.colorado.edu) or in the *Summer Session Catalog*.

Students who wish to register for a course on a *pass/fail* basis should do so when they register or before the deadline by applying online at [MyCUInfo.colorado.edu](http://MyCUInfo.colorado.edu) under the Academics and Research tab in the Registrar Forms channel. Changes to or from a *pass/fail* basis are not permitted after the the third Friday of the semester in the fall and spring or after the drop/add deadline in the summer.

All students who register on a *pass/fail* basis appear on the class roster, and a letter grade is assigned by the instructor. When grades are received in the Office of the Registrar, those courses that have a *P/F* designation are automatically converted from letter grades to *P* or *F*. Grades of *D-* and above are considered passing grades.

## Variable Credit

All independent study courses, and occasionally regular courses, are offered on a variable-credit basis. Students must designate the number of credit hours they wish to receive for the course at the time of registration. Consult the registrar's website at [registrar.colorado.edu](http://registrar.colorado.edu) or the *Summer Session Catalog* for variable-credit hour ranges for particular courses.

## Time Off Program (for Graduate Students Only)

The Time Off Program (TOP) is a planned-leave program for degree-seeking CU-Boulder graduate students who wish to take a leave of absence from the university. Students must be in good ethical and academic standing with the university and cannot be on academic suspension with their college or school. Students on TOP will have up to four semesters, including summer, to pursue academic or nonacademic interests, and they do not need to reapply to the university.

TOP guarantees participating students a place in their current college or school and in their current major when they return to the university.

Additional information and a TOP application can be obtained from the Office of the Registrar, Regent Administrative Center 105. A nonrefundable \$50 program fee is required at the time of application to TOP.

NOTE: Graduate students registered for the semester they plan to begin TOP must formally withdraw. See the withdrawal section below. Call **303-492-6970** for more information, or visit the registrar's office website at [registrar.colorado.edu](http://registrar.colorado.edu), or e-mail [timeoff@colorado.edu](mailto:timeoff@colorado.edu).

### Stay Connected (for Undergraduate Students Only)

Beginning fall semester 2010, undergraduate students who withdraw and then wish to return to the university will have up to four semesters, including summer, to return to the university without having to reapply for admission. See information and exclusions under "Readmit Students" or visit [registrar.colorado.edu](http://registrar.colorado.edu).

Stay Connected students may purchase a package of services to use while on leave (if eligible). These services include Wardenburg Student Health Insurance, access to the Recreation Center, early application for scholarships, etc. Students wanting this package of services must first sign up for the Stay Connected Program and pay a \$50 administrative fee at the Office of the Registrar. Some of the services available to these students are only available for an additional fee.

### Withdrawal Procedures

Students may officially withdraw from the university by filling out a withdrawal form in the Office of the Registrar, Regent Administrative Center 105, by sending a letter of withdrawal to Office of the Registrar, University of Colorado at Boulder, 20 UCB, Boulder, CO 80309-0020, by faxing a letter to **303-492-8748**, or by e-mailing [withdraw@colorado.edu](mailto:withdraw@colorado.edu) from the student's CU e-mail account.

In all terms, students are not permitted to withdraw after the last day of classes.

Failure to withdraw will result in a failing grade being recorded for every course taken in a term and makes a student liable for the full amount of tuition and fees for that term. For refund stipulations, see the withdrawal policy regarding tuition and fees, in this catalog.

Rules for withdrawing may vary with each college and school. Students anticipating a withdrawal should consult with their dean's office and read the withdrawal information on the registrar's website at [registrar.colorado.edu/students/withdraw.html](http://registrar.colorado.edu/students/withdraw.html) or in the *Summer Session Catalog* for specific withdrawal procedures. More information is available in the Office of the Registrar, Regent Administrative Center 105, **303-492-6970**, on the Web at [registrar.colorado.edu](http://registrar.colorado.edu), or by e-mailing [withdraw@colorado.edu](mailto:withdraw@colorado.edu).

Withdrawing students (including students applying for the Time Off Programs) with Federal Perkins/NDSL loans must complete a loan exit interview before leaving the university. Failure to do so will result in a "hold" on your record. This hold will prevent you from receiving a diploma or an academic transcript from the university and from registering for future terms. In order to complete a loan exit interview, contact the university Student Loans department in the Bursar's Office at **303-492-5571**, or **1-800-925-9844**.

Beginning fall semester 2010, students who withdraw and then wish to return to the university will have up to four semesters, including summer, to return to the university without having to reapply for admission. See information and exclusions under "Readmit Students" or visit [registrar.colorado.edu](http://registrar.colorado.edu).

## Other Registrations

### *Concurrent Registration*

Boulder-campus students who are unable to obtain courses required for their degree program on the Boulder campus may be allowed to register for up to two courses or 6 credit hours, whichever is greater, on another University of Colorado campus. (NOTE: Application forms and registration are done by the "home" campus.) Participating students must be enrolled for at least one course on the Boulder campus.

NOTE: Graduate students should check with the Office of the Registrar for exceptions to the home-campus registration requirement and limitation on credit hours at the host campus.

Students taking required courses in the Leeds School of Business or in the Graduate School of Business Administration may only exercise the concurrent registration option if they are in their graduating semester; business students who are two semesters from graduating and who cannot obtain courses necessary to complete a prerequisite sequence may also be allowed to use this option. The courses must either be required for graduation or unavailable on the Boulder campus, or the courses must conflict with another required course in which the student is enrolled.

Boulder students exercising this option will pay tuition for their total credit hours at Boulder-campus rates. Concurrent registration forms and instructions are available at the Office of the Registrar, Regent Administrative Center 105, 9:00 A.M.–5:00 P.M. Registration takes place only during the designated schedule-adjustment period of the host campus.

### *Registration on Another CU Campus*

Boulder-campus students who wish to take course work on another campus of the University of Colorado and not through the concurrent registration program may be able to register on that campus independent of Boulder-campus registration. However, students must apply for admission to and follow the registration procedures established by the other campus. Students should check with their dean's office for approval.

### *Late Registration*

Students in certain categories may be allowed to register late for a fall or spring semester if not registered in any classes as of the third Friday of the semester. These students are assessed a \$100 late registration fee, if eligible for late registration.

Graduate students registering as candidates for degree or for thesis hours must register by the third Friday of classes in a fall or spring semester or be subject to the \$100 late registration fee, if late registration is held for their category. For more information, call **303-492-6970**.

### *Registration for Faculty and Staff*

All permanent faculty and staff are eligible to take 1–9 free credit hours each fiscal year, depending on their percentage of employment. All participants of this program must be admitted to the university as nondegree or degree-seeking students. Faculty and staff who wish to enroll in the free courses must submit a faculty/staff tuition waiver form to the Bursar's Office, Regent Administrative Center 150, 43 UCB, Boulder, CO 80309-0043. Faculty and staff who are not continuing students (i.e., enrolled in the prior semester) must also submit the appropriate application as well as the tuition waiver form. Applications and the tuition waiver forms are available at the Bursar's Office or at [www.colorado.edu/bursar](http://www.colorado.edu/bursar). After the forms are processed, the Office of the Registrar will issue registration materials.

The tuition waiver form must be submitted by the deadline published on the bursar's website ([www.colorado.edu/bursar](http://www.colorado.edu/bursar)) or in the *Summer Session Catalog*. To take advantage of the free credit hours, faculty and staff must wait until the day before classes start to register for fall and spring semesters. For summer semester, registration starts the first day of classes for the summer term in which you plan to enroll. Additional classes that will be paid by the student may be registered for prior to the first day of class. Detailed information is available under the faculty/staff link at [www.colorado.edu/bursar](http://www.colorado.edu/bursar).

## Commencement

Students must apply to their dean's office for graduation at least one semester before they intend to graduate. Graduation ceremonies are held in May and December and are open to the public. No tickets are required. The May commencement is held at Folsom Stadium and the December ceremony is held in the Coors Events/Conference Center. Students receiving their degrees in August should check with their dean's office if they wish to attend the May or December ceremony. Details concerning the ceremony are e-mailed to graduating students approximately one month before each ceremony. Students may also access the current semester's ceremony information at [www.colorado.edu/commencement](http://www.colorado.edu/commencement).

Only doctoral and law graduates receive their diplomas at commencement. Diplomas are mailed to all other students approximately two months after the ceremony. Students may pick up their diplomas during scheduled distribution at the Office of the Registrar approximately two months following graduation. Diplomas not picked up are mailed to students' permanent addresses. Standard diploma size is 8 x 10 inches.

Graduating students with Federal Perkins/NDSL loans must complete a loan exit interview and clear all outstanding financial balances before leaving the university. Failure to do so will result in a "stop" on the student's record. This stop prevents receipt of a diploma or an academic transcript of work at the university and registration for future terms. Students can complete a loan exit interview by contacting the university Student Loans department in the Bursar's Office at **303-492-5571**, TTY **303-492-3528**.

## Campus Facilities

### Anderson Language and Technology Center

The Anderson Language and Technology Center (ALTEC) is a state-of-the-art facility supporting the study of foreign languages and cultures at the university. ALTEC offers the Foreign Language Technology Program (FLTP), which trains graduate students to use cutting-edge digital technology in their teaching. ALTEC also offers noncredit foreign language classes for faculty, staff, and graduate students on the Boulder campus.

ALTEC's facilities consist of a Macintosh laptop/collaboration station lab open to all students; a PC classroom for reservation by foreign language faculty; a sound recording studio for faculty/student project development; and a multimedia library. The library includes thousands of foreign films on DVD and VHS, textbooks, journals, and foreign language magazines. Computers, videocameras, and other hardware are available for checkout.

The center also broadcasts satellite programs from the International Channel and SCOLA. Located in Hellems, ALTEC is open to all students, faculty, staff, and alumni with an interest in foreign language study.

### Coors Events/Conference Center

The Coors Events/Conference Center is a multipurpose facility used for events such as educational conferences, seminars and meetings, convocations, and commencement ceremonies, as well as cultural, entertainment, and athletic activities that enhance and further the objectives of the university.

The main arena of the center seats between 8,500 and 12,000, depending on event configuration.

### Fiske Planetarium and Science Center

Fiske is considered one of the finest planetarium facilities in the world. Seating 212 people in its star theatre, it is the largest such facility between Chicago and Los Angeles. The planetarium is equipped with a Zeiss Model VI star projector and an automated projection control system that operates hundreds of projectors and has the capacity to present over a dozen prerecorded star shows at any given time. Fiske recently acquired "Science on a Sphere," an exciting new way to visualize science. In addition to its use as a teaching facility for astronomy and other classes, the planetarium is used for star talks, star shows, laser shows, and space science presentations to school children and the general public in the Boulder-Denver area.

### Heritage Center

The CU Heritage Center explores the history of the University of Colorado through exhibits that highlight student achievements, notable alumni, and prize-winning professors. Each room features a different CU story from the Tuscan-inspired campus architecture to CU astronauts, Nobel prize winners, and athletics traditions. Visitors can also find answers to some of the most commonly asked questions about campus history, such as how Ralphie got her name or why we call the University of Colorado "CU" instead of "UC."

The CU Heritage Center is open to anyone who loves CU and wants to find out more about its unique history and traditions. The Heritage Center is also a great resource for finding historic photos and information for papers and class projects. Open Monday-Friday, 10:00 A.M.-5:00 P.M. For more information, call **303-492-6329** or visit [www.cuheritage.org](http://www.cuheritage.org).

### Libraries

The university libraries system includes Norlin Library and five branch libraries. Norlin houses book stacks, periodicals, and research and instructional services for the general humanities and social sciences, art and architecture, East Asian materials, and the life sciences; as well as archives, government publications, special collections, media, circulation, reserve, and interlibrary loan. Norlin also features a learning commons in partnership with campus Information Technology Services that includes 24-hour Buff OneCard access, a café, team technology rooms, and a variety of technology services.

The William M. White Business Library is in the Business Building, the Jerry Crail Johnson Earth Sciences and Map Library is in the Earth Sciences Building, the Leonard H. Gemmill Engineering Library is in the Mathematics Building, the Oliver C. Lester Library of Mathematics and Physics is in Duane Physics, and the Howard B. Waltz Music Library is in the Imig Music Building. The Law Library is located in and administered by the Law School.

This system provides:

- dedicated librarians and staff who provide reference and research assistance, extended consultations, and instruction



- the largest library collection in the Rocky Mountain region—more than 12 million books, periodicals, computer-based resources, government publications, microforms, audiovisual materials, maps, manuscripts, papers, and artifacts
- an online system, Chinook ([libraries.colorado.edu](http://libraries.colorado.edu)), that provides access to the libraries holdings and thousands of electronic journals and indexes; national, state, and local services; and many other significant research and reference tools
- a website at [ucblibraries.colorado.edu](http://ucblibraries.colorado.edu) that includes a wealth of information about the libraries, services, and research resources with links to each department and branch in the libraries system, and a Libraries News and Events page
- special collections and archives including English, American, and children's literature; mountaineering; photography; the book arts; medieval manuscript leaves; peace and justice; history of Colorado and the West; environmentalism; women's history; and labor
- a regional depository of Colorado, U.S. government, United Nations, European communities, and World Trade Organization documents, with extensive holdings for World Bank, International Monetary Fund, OECD, UNESCO, and other U.N.-affiliated organizations, as well as British documents.

For more information, call **303-492-8705** or visit [ucblibraries.colorado.edu](http://ucblibraries.colorado.edu).

### Macky Auditorium Concert Hall

Originally built in 1912, Macky Auditorium Concert Hall is one of Colorado's premiere concert halls. The 2,047-seat venue features classical and popular musical concerts, dance performances, lectures, and films. It is home to the Artist Series, the Boulder Philharmonic Orchestra, Macky Presents, and College of Music ensembles. The auditorium also houses the Andrew J. Macky Gallery, with artwork by local and national artists. For information on all events, call the Events Line at **303-492-6309** or visit [www.colorado.edu/macky](http://www.colorado.edu/macky).

### Museum

The University of Colorado Museum houses extensive collections in anthropology, botany, geology, and zoology. The museum is nationally recognized for its holdings of specimens from the Rocky Mountain Region and beyond, making it a primary resource for faculty and student research. A program of foreign and domestic exchange of specimens and information has given the museum an international reputation.

The museum administers an interdisciplinary master's degree in museum and field studies. A collections/field track is provided for students interested in the curatorial and research aspects of museum work, as well as an administrative/public track for students interested in the public aspects of this work. A graduate professional certificate in museum and field studies is offered to graduate students in other disciplines, museums, and other professionals.

Through internships and assistantships, the museum provides professional experience to students in the field and in the laboratory. Museum faculty members teach courses in their areas of specialty, which include Southwestern archaeology and ethnology, plant systematics, invertebrate zoology, entomology, and paleontology. Participation in museum-related research is encouraged by financial support to selected, qualified students through the Walker Van Riper and William Henry Burt Funds.

The exhibit halls in the Henderson building are open daily to the public. The Paleontology Hall exhibits fossils and focuses on local paleontology. The Biology Hall shows animals of Colorado and the Rocky Mountain region. The Anthropology Hall emphasizes the fieldwork of CU-Boulder researchers. Temporary exhibits are presented each year. In addition, the museum offers extensive outreach programs to the schools and presents a number of special events, lectures, and activities for the community.

The CU Museum is accredited by the American Association of Museums.

### Recreation Center

Funded largely by student fees, the Student Recreation Center is one of the finest facilities of its type in the country. The center includes a 25-yard swimming pool and a 14-foot diving well; a patio for sunbathing; an ice arena used for hockey, broomball, and skating; handball/racquetball, squash, and tennis courts; a multi-use gymnasium; an indoor climbing wall; dry heat saunas; a free weight room; a dance/aerobics room; three regulation-sized basketball courts with a one-tenth mile running track suspended overhead; a spinning studio; and a fitness systems room with Cybex and cardiovascular equipment.

Current fee-paying students, their guests, and other members may take advantage of the facilities by showing their student Buff OneCard or membership card. A variety of sports equipment, including volleyball sets, tents, sleeping bags, snowshoes, and cross-country skis, can be checked out overnight for a nominal fee.

Members may also participate in a wide range of team sports including ice hockey, ultimate frisbee, rugby, swimming, diving, lacrosse, soccer, baseball, and many others through the club sports program.

The recreation center also offers many other programs geared toward specific interests and instructions. The outdoor program offers students the opportunity to learn about the outdoors through special trips featuring rock climbing, backpacking, rafting, hiking, cross-country skiing, snowshoeing, and scuba diving, in addition to educational presentations. Through the instruction program, members may participate in noncredit classes at various levels of instruction in aquatics, aerobics, tennis, fitness, CPR and first aid, martial arts, lifeguard training, yoga, and dance.

The intramural program offers leagues, tournaments, and special events in basketball, soccer, broomball, dodgeball, hockey, touch football, and other sports. For more information, visit [www.colorado.edu/rec-center](http://www.colorado.edu/rec-center).

### Sommers-Bausch Observatory

Located on the Boulder campus, the Sommers-Bausch Observatory has 16-, 18- and 24-inch aperture Cassegrain telescopes for undergraduate and graduate astronomy classes and research. Ancillary instrumentation is available for digital CCD imaging and spectroscopy. During daylight hours a heliostat is used to view the solar photosphere and chromosphere. The observatory is also open to the public on Friday evenings for viewing of the planets, stars, and nebulae, as weather permits. Call **303-492-5002** for reservations.

### University Memorial Center

This is the place where students spend out-of-the-classroom time to grab a bite to eat, meet friends, enjoy free entertainment, shop, study, do some banking, or just hang out! More than 14,000 people visit every day. Throughout its five floors,

the UMC can simultaneously be an exciting, lively center and a comfortable haven.

There's live music in the atrium; concerts and lectures in the Glenn Miller Ballroom; local bands in Club 156 (an alcohol-free night club); bowling, pool, and games in the Connection; works by national and international artists in the Art Gallery, programs for enhancing cultural awareness in Dennis Small Cultural Center, quiet lounges, and delicious food from a wide variety of restaurants.

In addition, 90 student group offices, student government, Radio 1190, CU NightRide, Off-Campus Student Services, Student Legal Services, Women's Resource Center, Volunteer Resource Center, and many other services make the UMC an exciting center for involvement and interaction. All UMC programs, facilities and services support student development within a welcoming, community-building environment.

The University Memorial Center (UMC) gets its name from its designation as the state of Colorado's official memorial to Veterans of War. For additional information, visit [umc.colorado.edu](http://umc.colorado.edu), or call 303-492-6161.

## Campus Programs

### Alumni Association

Undergraduates are Forever Buffs! The CU-Boulder Alumni Association launched its Forever Buffs initiative in November 2008 that welcomes all undergraduate students and alumni as lifelong members of the association. A one-time freshman and new transfer student fee of \$70, effective fall 2009, guarantees every Buff a lifetime of programming and services.

By being inclusive, the association aims to foster lifelong CU relationships through programs and services that engage, contribute, and celebrate being a Buff. Throughout their undergraduate experience, students can network online with alums around the world on the free Forever Buffs Network at [www.cualum.org](http://www.cualum.org). The Ask a Buff tab, in particular, enables students to contact alums to get advice regarding relocating to a new city, applying to graduate school, or getting a job in a particular field. During the summers and post-graduation, students can become involved in the regional alumni chapters where they live.

Students also can join the Herd, one of the largest student alumni groups in the country. The Herd provides a community for students interested in celebrating CU pride and participating in a range of activities including ski trips, hikes, memorable traditions like CU Idol and Mr. CU, and events like St. Baldricks Day, which raises money for children with cancer. The Herd also provides leadership opportunities through university events like Homecoming and Teacher Recognition Awards. Student membership is \$20 annually or \$49 until graduation. Members can take advantage of free meals prior to home football games, \$5 rides on the CU ski bus (\$15 for non-Herd members), and other discounts around Boulder.

For additional information, call 303-492-8484 or 800-492-7743 or visit [www.cualum.org](http://www.cualum.org) or [www.cuherd.com](http://www.cuherd.com).

### Alliance for Technology, Learning, and Society

The Alliance for Technology, Learning, and Society (ATLAS) Institute at CU-Boulder promotes excellence throughout the total learning environment by integrating information and communication technology into curricula, teaching and learning, research, and outreach activities. ATLAS is changing the

campus learning culture by enabling all students, even those in traditionally nontechnical fields, to experience firsthand the role that information technology can play in their disciplines.

Through ATLAS, CU-Boulder is examining the integration of technology into its curricula, conducting research that critically assesses the impacts of technology on education and on society, and interacting with the K-12 system to help effect many of the same transformations at that level. In conjunction, CU-Boulder is providing an excellent technological infrastructure for all of its students, faculty, and staff.

The ATLAS Building, located in the heart of the CU-Boulder campus, is a 66,000-square-foot facility that includes the Byyny Teaching and Learning Center, the Faculty Teaching Excellence Program and Graduate Teacher Program, and technology-enhanced classrooms and auditoriums for use by the entire campus. A two-story Black Box performance theater and a production studio are venues for transdisciplinary collaboration among the performing arts and production departments on campus. An exhibition lobby with video wall, a second-floor wireless lounge, and a coffee shop provide gathering spaces. More information on the various initiatives of ATLAS, including the minor in Technology, Arts, and Media or the Certificate in Digital Media, can be obtained at the Alliance for Technology, Learning, and Society or the Certificate in Digital Media, University of Colorado at Boulder, 320 UCB, Boulder, CO 80309-0320, 303-735-4577, or [atlas.colorado.edu](http://atlas.colorado.edu).

### CU Art Museum

Founded in 1939, the CU Art Museum is a cultural gateway to the University of Colorado at Boulder, facilitating engagement with larger societal issues through a greater understanding of the arts in a global context. The CU Art Museum is committed to enhancing understanding and appreciation of the visual arts within the academic community and among regional, national, and international audiences. It provides access to art of the highest quality through exhibitions, publications, and related educational events that reflect diversity, critical thinking, and creative research. The museum also facilitates student training in museum practices. As a collecting institution, the CU Art Museum promotes the excellence, preservation, scholarly interpretation, exhibition, and growth of its comprehensive permanent collection, which includes artworks from numerous time periods, artistic traditions, and cultures. The new 25,000-square-foot CU Art Museum contains five galleries including permanent collection galleries, changing exhibition galleries, and a video gallery. The CU Art Museum also includes a collections study center, allowing students, faculty, and researchers the opportunity to schedule appointments to view, research, and study works in its Permanent Collection.

The Permanent Collection of the CU Art Museum contains over 6,000 works of art. The collection includes works from numerous time periods and cultures including ancient Greek pottery, Roman glass, ancient Iranian pottery, Southwestern and South American *santos*, Southeast Asian pottery, African sculpture, Old Master works on paper, British 18th century prints, 19th and 20th century American prints and paintings, Japanese *ukiyo-e* prints, 19th century photography, Pop art, Minimalist works on paper, and modern and contemporary ceramics, sculpture, works on paper, paintings, photography, video, and new media art.

The CU Art Museum is currently closed during construction of a new "state-of-the-art" museum facility. The museum will open its inaugural exhibitions in the fall of 2010. Visit the CU

Art Museum's website at [www.colorado.edu/cuartmuseum](http://www.colorado.edu/cuartmuseum) for updates on exhibitions and programs at various campus and community locations during construction of the new facility.

### Clubs and Organizations

Clubs and organizations of almost every description are available on the CU-Boulder campus including nearly 1,000 academic, political, social, religious, and recreational groups. The Ski and Snowboard Club, Amnesty International, CU Wild, Campus Ambassadors, Black Student Alliance, Program Council, College Republicans, and the Residence Hall Representative Council are examples of student organizations that offer a variety of opportunities for students to become involved with others on campus.

All clubs and organizations provide an excellent way for students to become involved in current events, student activities, and community service. For more information, consult the University of Colorado Student Union's Club Guide online at [castle.colorado.edu/guide/guide\\_Frames.htm](http://castle.colorado.edu/guide/guide_Frames.htm) or stop by a student organization's office in the UMC. Students interested in forming clubs and organizations on campus can contact the Student Organizations Finance Office in UMC 231 or call 303-492-6366.

### Colorado Space Grant Consortium

The Colorado Space Grant Consortium is a NASA-funded program that uses the excitement of the nation's aeronautics and space program to inspire, educate, and develop America's future technological workforce by enabling a diverse community of students to participate in space-based, hands-on projects and courses. Space Grant students receive research experience in space science and engineering as they apply their classroom learning to real-world space hardware projects. Space Grant students work on BalloonSat payloads, sounding rocket payloads, low earth orbiting satellites, and other space hardware projects, mentored by CU faculty and engineers from Colorado aerospace companies. Students earn hourly wages, research assistantships, and/or independent research credit. Courses include Gateway to Space and Independent Research Studies. Space Grant students gain valuable hands-on experience in space science and engineering projects by participating in one of several missions and are highly recruited by industry.

For information, visit [spacegrant.colorado.edu](http://spacegrant.colorado.edu) or contact the Colorado Space Grant Consortium, University of Colorado at Boulder, 520 UCB, Boulder, CO 80309-0520, 303-492-3141.

### Concerts

CU Presents includes the Artist Series, CU Opera, Encore Series, and the Holiday Festival.

The Artist Series in Macky Auditorium features a wide array of internationally renowned performing artists in classical music, jazz, dance, and world music. Pink Martini and the Kronos Quartet are a few of the outstanding performers who have appeared recently as part of the Artist Series.

CU Opera presents the best in opera and musical performance in Macky Auditorium and the Music Theatre. Recent performances have included *La Traviata*, *Don Giovanni*, and Ned Rorem's *Our Town*.

The Takács Encore Series features concerts by CU's Grammy Award winning Takács Quartet in Grusin Music Hall; and the annual Holiday Festival in Macky Auditorium features students and faculty in a celebration of seasonal music.

Students may purchase Concert Cards that entitle them to a 50 percent savings on tickets for Artist Series and CU

Opera performances. A free brochure and concert calendar may be obtained by calling 303-492-8008 or visiting [www.cupresents.org](http://www.cupresents.org).

### Faculty Teaching Excellence

For information on either of the programs described below, call 303-492-4985. The FTEP website is located at [www.colorado.edu/ftep](http://www.colorado.edu/ftep), and the PTSP website is at [www.colorado.edu/ptsp](http://www.colorado.edu/ptsp).

#### *Faculty Teaching Excellence Program*

The CU-Boulder campus focuses on students in the learning process through peer collaboration, active engagement, and reciprocity between faculty and students. The Faculty Teaching Excellence Program (FTEP) is built on the research literature of learning and teaching and the principle that faculty learn about teaching best from one another.

The goals of the FTEP are to improve undergraduate and graduate education and to assist faculty in reflecting on their teaching in order to improve students' learning. Within this overall mission are more specific objectives: to work with faculty to create an environment that encourages learning for both faculty and students; to foster a professional dialogue among all faculty concerning effective learning; to bring pedagogical research and useful teaching tips to the attention of faculty; to assist in writing goals and assessing learning; and to engage in research on learning and teaching.

Since 1986 the FTEP has provided an array of programs designed primarily to improve teaching and to innovate in learning. While this aim clearly stands out as a first priority and must continue to be a central focus, the current stage in FTEP's development emphasizes the obverse of teaching, namely, learning. Focusing on how students learn follows naturally and logically from our well-established emphases on teaching behaviors, faculty expectations, and critical reflection about pedagogy.

#### *President's Teaching Scholars Program*

The President's Teaching Scholars Program (PTSP) has produced a sustaining group of teacher scholars who are advocates of and consultants for the integration of teaching and research at the university. The designation is the highest honor for teaching and research in the CU system. Faculty designated for the program design and develop projects aimed at strengthening confidence and at teaching well and proudly and thereby establish a faculty learning community. The scholars share their teaching acumen outside the university community and exemplify the skills, talents, and characteristics of education researchers and scholars. The guild numbers 72 teaching scholars.

The President's Teaching Scholars are chosen not only for their capacities in their own classrooms, but also for their promise of improving education and enlarging its possibilities across the university. Now 20 years in existence, this program has established the Colorado Learning Assessment Studies (CLAS) to assist faculty in understanding student cultures and the President's Teaching and Learning Collaborative (PTLC) to assist faculty on all campuses to establish scholarship in teaching and learning (SoTL) and thereby influence learning in their disciplines locally, nationally and internationally.

The President's Teaching Scholars Program sponsors system wide participation in the Carnegie Foundation for the Scholarship of Teaching and Learning Academy (CASTL).

### Greek Social Organizations

More than 1,100 students currently participate in CU-Boulder's approximately 20 Greek social organizations, emphasizing ser-

vice, leadership, scholarship, and involvement in campus life. Many of these organizations have houses off campus where members can live after their first year. The university works through the Greek Life Office to establish an educational, growth-oriented environment for Panhellenic sorority and multicultural Greek organization students that integrates them fully into the campus community.

The Greek system is autonomous from the university. The university has established expectations of fraternal organizations that can be viewed at [www.colorado.edu/greeks/office/community.html](http://www.colorado.edu/greeks/office/community.html). As of fall 2005, all Panhellenic sorority chapters and multicultural Greek organizations have agreed to abide by all requirements.

National Interfraternity Council fraternity chapters have chosen not to meet the expectations and are not recognized by the university.

A hazing tips line has been established at the university. Anyone who witnesses or experiences hazing in any form should report it to **303-492-0140**.

Additional information on the Panhellenic sororities and multicultural Greek organizations may be obtained by calling the Greek Life Office at **303-492-6359**.

## Honor Societies

Outstanding student scholarship is recognized at the University of Colorado at Boulder through national and local honor societies. The national honor society, Phi Beta Kappa, founded in 1776 at the College of William and Mary in Virginia, was established at CU-Boulder in 1904. Phi Beta Kappa recognizes outstanding scholastic achievement in the liberal arts and sciences. The campus also has a chapter of Sigma Xi, an honor society for scientists. Sigma Xi's goals are to advance scientific research, to encourage communication among scientists, and to promote the understanding of science.

Other national honor societies with local chapters at Boulder are Beta Gamma Sigma (business), Phi Delta Kappa (education), Tau Beta Pi (engineering), Kappa Tau Alpha (journalism), Order of the Coif (law), and Pi Kappa Lambda (music). The criteria for membership in honor societies and their activities vary.

For more information on both national and local societies, consult the individual college and school sections.

## Intercollegiate Athletics

The University of Colorado is a member of the Big 12 Conference, and sponsors teams in a variety of intercollegiate sports. Competing at the national level, the Colorado Buffaloes pride themselves on many individual and team championships.

Every year since 1989, at least 10 programs have been ranked annually in the top 25 in the nation (out of 16 varsity sports overall). In 2004, CU became just the fourth school to sweep the NCAA cross-country championships when both the men's and women's teams claimed titles. In 2006, CU won its 17th national title in skiing and third in men's cross-country, raising the school's overall total to 23, fourth-most by a Big 12 Conference member school. The football program owns the 16th most victories of all time, won the 1990 national championship, and most recently has won four Big 12 North Division titles and the 2001 league title. Several other programs are regular participants in the NCAA postseason, most notably women's basketball, soccer, and volleyball along with men's golf. The track teams regularly send multiple individuals into the postseason as well.

In its 119-year athletics history, over 500 student-athletes have been named All-American, with thousands earning academic honors.

There are over 300 student-athletes involved in intercollegiate athletics annually (roughly 53 percent men and 47 percent women). The average GPA for student-athletes was a record 2.830 in 2008–09, near the average for the entire Boulder campus.

Men's varsity sports include football, basketball, cross-country, track and field, skiing, and golf. Women's varsity sports include basketball, cross-country, golf, track and field, skiing, soccer, tennis, and volleyball.

Folsom Field, a 53,750-seat stadium, serves as the home of the Colorado Buffaloes football team. The basketball teams practice and compete in the Coors Events/Conference Center, which seats 11,064. The golf and tennis teams use local clubs as their headquarters, and the ski team takes advantage of Colorado's many ski resorts, including its home mountain, Eldora. The women's volleyball team uses both the Coors Events/Conference Center and Carlson Gymnasium. The soccer team uses Prentup Field on CU's East Campus.

Boulder's diverse terrain and a running-conscious community combine to create a vigorous atmosphere for track and cross-country training. The track teams practice and compete at Balch Fieldhouse on the Main Campus and at Potts Field on the East Campus. Cross-country has a world-class course on the grounds of CU's future South Campus.

## International Education

The Office of International Education (OIE) houses the International Student and Scholar Services and Study Abroad Programs. OIE serves as a liaison for international activities among academic departments, administrative units, international universities and governments, and U.S. governmental agencies and foundations. OIE provides support for students and faculty who desire to study or conduct research overseas; for international students, faculty members, and visitors who come to CU-Boulder; and for all members of the campus community who wish to develop an international dimension in their teaching, research, or study.

Specific functions include expediting the exchange of students and faculty, sponsoring undergraduate study abroad programs, assisting international visitors, promoting special relationships with overseas universities, and advising on international scholarships.

### Study Abroad Programs

The information below applies to approved CU-Boulder study abroad programs. The policies and procedures for participation on independent study abroad programs vary according to the student's school/college within CU.

CU-Boulder offers over 275 study abroad programs in over 65 countries, and programs vary by academic subject and duration. Students may study abroad for a summer, a semester, or a year. Many types of programs are available, including direct enrollment in an overseas university; programs at study centers with courses offered in English; and Global Seminars, which are courses offered abroad by CU faculty during summer or winter break.

Students must be enrolled in at least the equivalent of 12 CU-Boulder credit hours each semester or at least 24 hours per academic year while on a study abroad program. Some programs have higher required credit minimums, and summer course load minimums vary by program.

Credit earned on a CU-Boulder study abroad program is considered “in residence” credit. This means that the credits taken abroad will appear on students’ transcripts, and will count toward their overall degree requirements unless they are above the limit of 45 hours of credit allowed in one department, or are in a subject for which CU-Boulder does not give credit (i.e., cooking, physical education, scuba, etc.). If appropriate courses are available and approved by students’ major and college academic advisors, the courses can be used to fulfill major and/or college requirements. It is also possible to obtain approval to fulfill arts and sciences core requirements on study abroad programs.

For some study abroad programs, letter grades earned abroad appear on students’ CU transcripts and count toward students’ cumulative GPAs. Because it is difficult to “translate” grades from another system of higher education, grades earned on some programs are converted to *pass/fail* using established criteria. Credits earned on programs that convert grades to *pass/fail* are exempt from limitations placed on *pass/fail* credit in Boulder. In the College of Engineering and Applied Science, all study abroad credit appears on the transcript as *pass/fail* credit (which is still exempt from limitations placed on *pass/fail* credit in Boulder).

Concurrent enrollment in a CU-Boulder study abroad program and CU-Boulder courses taught on campus is not allowed. This includes independent study and ROTC courses. Each course taken abroad is listed on the CU transcript under the department that would most likely offer the course in Boulder. Students are not allowed to take early exams, make-up exams, or incompletes on study abroad programs. Most internships are done for no credit; in order to receive credit, students must obtain written approval from the appropriate academic department using the study abroad internship approval form. Courses designated as service learning usually count for credit toward the degree. The course repetition program does not apply in any way to study abroad, nor does the Colorado Opportunity Fund.

All programs have GPA and class-standing prerequisites, and some programs also have language requirements. Planning ahead is essential and students are encouraged to consult with their academic advisors and with study abroad advisors to select a program that fits their needs. More information about study abroad is available at the Office of International Education, Environmental Design 1B01, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123, 303-492-7741, e-mail [study-abr@colorado.edu](mailto:study-abr@colorado.edu), or visit [studyabroad.colorado.edu](http://studyabroad.colorado.edu). More information about CU-Boulder’s academic policies on study abroad programs can be found in the Essential Guide to Study Abroad available on the study abroad website.

### *International Student and Scholar Services*

CU-Boulder has welcomed international students and scholars for many years. Currently more than 1,200 international students and over 650 scholars and visiting faculty members from more than 80 countries are on campus. International Student and Scholar Services (ISSS), a part of the Office of International Education, provides information and assistance to international students and visiting scholars regarding university procedures, immigration requirements, liaison with sponsors and home governments, and other matters of special concern to students and scholars from other countries. All international students and visiting international faculty and scholars are required to check in at ISSS upon arrival at the university and to maintain contact with the staff during their stay at the university. Federal regulations governing the stays of international visitors to the United

States have changed recently, making these services even more important to students and scholars.

In addition to the services described above, International Student and Scholar Services provides a number of opportunities for students and scholars to learn more about the community around them. The office works with Boulder Friends of International Students (BFIS) in matching students with local community members to provide social and cultural activities to help new arrivals in adjusting to the CU and Boulder environment. A number of annual events are planned by the office in order to provide a cross-cultural learning environment. Social/cultural activities for international students include an annual spring International Festival that celebrates the diversity of international students on the campus. The CU International Student Club sponsors an international coffee hour that encourages student and faculty interaction over refreshment every Friday afternoon that helps newly arriving international students learn about campus and community life. For more information about international students and scholars, call 303-492-8057 or visit [www.colorado.edu/oie/iss](http://www.colorado.edu/oie/iss).

### International English Center

The International English Center (IEC), as a unit of CU-Boulder’s Division of Continuing Education and Professional Studies, provides intensive English-language instruction to students from all parts of the world. Classes are offered in eight-week sessions (with a four-week option in summer) at four levels of English-language proficiency and in all language skills. The program is designed to prepare international students for academic study at colleges and universities in Colorado and elsewhere in the United States. At advanced proficiency levels, IEC students are permitted to enroll concurrently in selected academic courses as additional preparation for a degree program.

The IEC’s curriculum is particularly appropriate for University of Colorado applicants who have been informed by the Office of Admissions that they are academically qualified but cannot be granted admission because of inadequate English-language proficiency. Such students are automatically eligible for study at the IEC. For IEC students who have not applied to CU-Boulder or any college or university in the United States, the IEC provides academic placement advice.

Through its English as a Second Language for Degree Students (ESLG) program, the IEC offers non-intensive credit and noncredit courses for graduate and undergraduate degree students who need further work in ESL. A recommendation is required to register for ESLG courses based on an English Placement Test administered at the beginning of the fall and spring semesters. Registration for ESLG courses is through the Division of Continuing Education and Professional Studies.

The IEC also offers non-intensive evening classes in English as a second language for international visitors and local residents.

Full information may be obtained from the International English Center, University of Colorado at Boulder, 63 UCB, Boulder, CO 80309-0063; in person at the IEC offices at 1030 13th Street; by phone, 303-492-5547; by fax, 303-492-5515; or visit [www.colorado.edu/iec](http://www.colorado.edu/iec).

### Music

With over 400 public concerts annually, the College of Music is a major musical resource in the Boulder–Denver metropolitan area. In addition to faculty and student recitals, the college features its own symphony orchestra, bands, choirs, and world music ensembles in regular concerts. Music for many tastes is

also provided through other College of Music ensembles such as the Jazz Ensembles and the Early Music Ensembles.

Guest artists, speakers, and special events provide a vibrant and diverse musical atmosphere at the university. Acclaimed artists including Thomas Hampson, the Kronos Quartet, Martin Isepp, Wynton Marsalis, James Galway, George Crumb, and alumnus David Grusin have recently appeared on campus. Many have recently presented free master classes open to students and to the public.

### Senior Auditor Program

During the fall and spring semesters, CU-Boulder offers state residents, who are 55 years of age or older, the opportunity to attend classes on a tuition-free, space-available basis. The only costs to senior auditors are books, if they wish to buy them, and a small processing fee due at registration. No record is kept of attendance; no examinations are taken for credit; and class participation is at the discretion of the instructor. Senior auditor privileges include the use of the university's libraries. For information, call **303-492-8484**.

### Service Learning Program

Service learning courses integrate academic course work with community service in a way that benefits students and faculty as well as communities. Service learning courses offer students an interesting way to apply and enhance their growing knowledge and skills, to gain work experience, to meet people in professions of interest, and to learn more about community dynamics.

Currently, over 50 faculty, 30 departments, and an average of 1,700 students at CU-Boulder annually participate in service learning courses. Linguistics students gain insights by teaching adults in literacy programs; engineering students design devices that provide greater functionality for people with disabilities; sociology students learn about community needs by working for homeless shelters; and students in scientific writing courses gain proficiency by writing proposals that bring in needed funds for K-12 science classes and scientific nonprofit organizations. Participating students gain confidence and expertise in their subject areas as they gain understanding about people and community needs.

The Service Learning Program Office works with faculty, students, community organizations, and other campus programs. To learn more about service learning opportunities at CU-Boulder, contact the Service Learning Program Office at **303-492-7718**, at [service1@colorado.edu](mailto:service1@colorado.edu), or [servicelearning.colorado.edu](http://servicelearning.colorado.edu).

### Theatre and Dance

Facilities for theatrical and dance presentations include the University Theatre Mainstage, the beautiful outdoor Mary Rippon Theatre, the Loft Theatre, and the Charlotte York Irey Dance Studio/Theatre.

The Department of Theatre and Dance presents six to eight major theatre productions each academic year, as well as three to four student produced and directed theatre workshops. The 2009-10 season included *The Blind*, *The Visit*, *The Real Inspector Hound*, *Philistines*, *Blood Wedding*, *The Country Wife*, *The Real Queen of Hearts Ain't Even Pretty*, and *Cabaret*. The dance division presents six to eight concerts featuring student, faculty, and guest artist work.

The Colorado Shakespeare Festival (CSF) is presented each summer in the outdoor Mary Rippon Theatre. One of the few repertory groups in the nation to have completed the entire Shakespearean canon, the festival has had 50 years of distinguished history, and features the most advanced students in

the CU-Boulder Theatre and Dance program as well as professional actors, directors, designers, and outstanding performers and technicians from MFA training programs throughout the country. CSF "alums" include Jimmy Smits, Annette Bening, Joe Spano, Tony Church, and Val Kilmer. Also in the summer, the department hosts the Boulder Jazz Dance Workshop and Frequent Flyers Productions' Aerial Dance Festival.

### Undergraduate Research

CU-Boulder offers several ways for undergraduate students to participate directly in research and creative work. Through such involvement, students acquire knowledge and skills seldom attained through classroom experience alone. Project results sometimes are presented at national professional meetings or published in scholarly journals.

### *College of Arts and Sciences Honors Program*

The Honors Program at the University of Colorado-Boulder is designed to provide special educational opportunities for highly motivated students. Honors is open to well-prepared freshmen, as well as sophomores and upper-division students from all colleges on campus. Through the Honors Program, students may ultimately graduate from the university with honors: summa cum laude, magna cum laude, or cum laude. Our requirements for graduating with honors are among the most rigorous—and we think the most rewarding—in the country. See Honors Program in the College of Arts and Sciences section for detailed information.

### Independent Study

Independent study course work provides students the opportunity to become involved in projects of their own choice. Projects could include writing a play, doing laboratory research, or designing a space-shuttle experiment. The number of credit hours earned depends upon the scope of the project. In all cases, work is done under the supervision of a faculty member and should be arranged as early in the semester as possible. Departmental and faculty approval is required, and all deadlines must be met. Students should consult with their associate/assistant dean's office about any special provisions.

### *Undergraduate Research Opportunities Program*

The Undergraduate Research Opportunities Program (UROP) sponsors undergraduate students who work in partnership with a faculty member on a research or creative project. UROP involves students in all areas of research—from writing proposals, to conducting research or pursuing creative work, to analyzing data and presenting results.

Interested students must identify a project and a faculty sponsor and then submit a proposal. Projects are designed around an aspect of the faculty sponsor's research or involve research or creative work of the student's own design. Proposals are evaluated on a competitive basis. Students are awarded up to \$1,200 in stipends/or expense allowances to support their projects. A limited number of \$2,400 summer research fellowships are offered to enable students to spend the entire summer engaged in research.

Students seeking an introduction to research, scholarly, or creative work conducted by faculty should consider applying for a research assistantship. Students can earn up to \$800 for this type of student/faculty collaboration. For information concerning opportunities for undergraduate research, contact the

UROP office in Norlin 5434, **303-492-2596**, or visit [www.colorado.edu/Research/UROP](http://www.colorado.edu/Research/UROP).

### United Government of Graduate Students

The United Government of Graduate Students (UGGS) represents more than 4,400 graduate and professional students on the Boulder campus. UGGS serves as the primary advocacy group for graduate and professional students on campus and actively pursues goals intended to enrich the quality of life on campus and the quality of graduate work at the university. UGGS is committed to improving the quality of health care and child-care benefits for graduate students, advocating for lower student fees and higher TA/RA stipends, and increasing the diversity of the graduate student population. UGGS serves as a link between the graduate student body and the CU administration, including the Graduate School, the dean of students, the Boulder Faculty Assembly, and various other administrative bodies.

UGGS consists of an assembly, with a representative from each department on campus, and an executive board, consisting of seven officers elected from the assembly. The assembly holds bimonthly meetings during the academic year to exchange information between the executive board and representatives and to provide a forum for discussion of graduate student concerns. All are welcome to the assembly meetings.

For more information on the United Government of Graduate Students, call **303-492-5068**, e-mail [uggsinfo@colorado.edu](mailto:uggsinfo@colorado.edu), drop by the UGGS office in UMC 127, or visit the UGGS website at [uggs.colorado.edu](http://uggs.colorado.edu).

### University of Colorado Student Union

Through the University of Colorado Student Union (UCSU), students make policies and control many Boulder campus facilities and programs. Based on its budget of more than \$33 million, half of which comes from student fees and the other half from self-generated revenues, UCSU is the nation's largest student government. UCSU operates facilities such as the Wardenburg Health Center, the University Memorial Center (UMC), the Student Recreation Center, and the campus radio station, KVCU. UCSU also offers students off-campus housing assistance, legal counseling, and many other services.

UCSU is divided into executive, legislative, and judicial branches. The UCSU executives, elected each spring by fee-paying students, head the executive branch. In representing the students, the executives work with the Board of Regents and the CU-Boulder administration on university policies and decisions. Support staff includes student administrators who work in key administrative offices and serve as liaisons between the students and the administration.

The legislative branch of UCSU is composed of an 18-member Legislative Council. Nine seats are occupied by representatives of the colleges and schools; the remaining nine seats are occupied by elected representatives-at-large. The joint boards on which council members and any interested student may serve include those in the environmental, recreation, health, finance, cultural events, and UMC areas.

The Appellate Court is UCSU's judicial branch. The seven students appointed by the executives as justices to the court are responsible for interpreting the UCSU constitution and ruling on specific appeals brought before them.

For more information regarding UCSU and getting involved, call **303-492-7473** or stop by UMC 125 between 8:00 A.M. and 5:00 P.M.

## Campus Services

### Career Services

Career development should be an integral part of a student's higher education. Career Services empowers students to take control of their professional development through programs that help them plan careers, find internships, secure post-graduate employment, and prepare for graduate school. Students are encouraged to use these services throughout their university experience. Located on the ground floor of Willard Administrative Center, Career Services is open during the academic year 8 A.M.–5 P.M. and during the summer 7:30 A.M.–4:30 P.M. Call **303-492-6541** or refer to [careerservices.colorado.edu](http://careerservices.colorado.edu) for more information.

#### Career Counseling

Professional counselors are available to help students:

- choose an academic major
- explore potential careers and make decisions about career opportunities
- develop skills in job seeking and résumé preparation
- refine interviewing skills through coaching and video practice interviews

#### Special Programs

Career Services offers several special programs throughout the year to help students prepare for their careers. These include the Annual Networking Night, Dining for Success Etiquette Dinner, and Suit Yourself. For a current schedule, visit [careerservices.colorado.edu](http://careerservices.colorado.edu).

#### Academic Department Liaisons

Each Career Services counselor works closely with academic departments to gather and disseminate career information specific to each academic field. Call **303-492-6541** to learn which counselor is the designated liaison to your academic department.

#### Graduate Student Career Programs

In partnership with the Graduate School, Career Services has a career counselor and program coordinator who focuses specifically on graduate students' career development needs and concerns. For details, see [careerservices.colorado.edu](http://careerservices.colorado.edu).

#### Career Program for Students with Disabilities

CPSD assists students and recent graduates in obtaining internships. Students participate in a series of career planning and disability meetings. A limited number of internship stipends are provided.

#### Recommendation Letters (Credentials)

Undergraduates planning to attend graduate school or graduate students planning to teach in higher education should open a professional credentials file to maintain and mail out letters of recommendation. Career Services is partnered with Interfolio, an online credentials service, to assist students with managing application materials and confidential documents. K–12 teacher candidates may self-manage their credentials file or use Interfolio. For more information about Interfolio and self-managed files, visit [careerservices.colorado.edu/students/interFolio.aspx](http://careerservices.colorado.edu/students/interFolio.aspx), or contact the credentials manager at **303-492-4128**, [credent@colorado.edu](mailto:credent@colorado.edu).

### Employer-Student Interaction

Career Services provides several ways for students to interact with employers offering internships and/or post-graduate career opportunities:

- **Career Services Online (CSO).** CSO is the online job listing service managed by Career Services. On CSO, students may access current internship and post-graduate career vacancies, apply directly to employers, and even sign up for on-campus interviews. Students who have signed up on CSO also receive weekly e-mails from Career Services informing them of upcoming events.
- **Internships.** Internships help integrate students' academic studies and career interests with related work experiences. Many internship positions offer salaries and some earn academic credit; all provide valuable experiences and the opportunity to explore career directions. Students who complete internships are significantly more attractive to employers when they graduate.
- **On-Campus Interviewing.** Employers from all over the nation use our facilities to interview students for both internships and post-graduate career employment. Students may sign up for interviews online, through the CSO system.
- **Employer Presentations.** Students may attend informal meetings hosted by employer representatives who present information about their organizations. Over 100 meetings are scheduled annually.
- **Employer Host.** Students have the opportunity to get acquainted with potential employers as they assist with employer presentations. Call **303-492-4133** if interested.
- **Résumé Referral.** Students actively seeking positions may choose to have their résumés automatically referred to employers who call daily seeking candidates for internships and career opportunities.
- **Career Fairs.** Career Services coordinates four fairs each year, with over 600 employers attending:
  - Multicultural Career Fair (September/October)
  - Fall Career and Internship Fair (September/October)
  - Spring Career and Internship Fair (January)
  - Just-in-Time Hiring and Internship Fair (April)
- **Student Help Desk.** Students who have questions about or need help with CSO or any other employer-student interactions may contact the Help Desk at **303-492-4100** or e-mail [career@colorado.edu](mailto:career@colorado.edu).

### Testing Services (National and Institutional Testing)

Testing Services offers a variety of academic tests for admission and exemption purposes. It also provides selected IT certification tests and private test proctoring. Many tests are in computer-based format and offered year-round (such as GRE-General), while others are paper-based and delivered on pre-set dates (including Arts and Sciences exemptions, LSAT, SAT, and PRAXIS Series). Testing Services is an authorized center for ETS-Prometric tests. All testing is by appointment. The main office is open weekdays throughout the year. Computer-Based Testing (for ETS tests) keeps variable hours that include Saturdays. The office is in Willard Hall within Career Services on the ground floor. The main office phone number is **303-492-5854**; computer-based testing may be reached directly at **303-735-2044**. For test dates, descriptions and registration information, see [careerservices.colorado.edu](http://careerservices.colorado.edu).

### Child Care

The University of Colorado Children's Center offers toddler and preschool programs for children 15 months to five years of age. The center is located at Newton Court, 2202 Arapahoe Avenue. The Children's Center is licensed by the state of Colorado and accredited by the National Association for the Education of Young Children (NAEYC). The center serves children of university students, staff, faculty, and alumni. It is open from 7:30 A.M. to 5:30 P.M., five days a week. Two, three, four, and five days per week schedules are available. For further information, call **303-492-6185** or visit [childcare.colorado.edu](http://childcare.colorado.edu).

### Computing and Media Resources

#### Information Technology Services

Information technology plays an integral role in the mission of the campus and the University of Colorado at Boulder is widely recognized as having a superior information technology (IT) environment. Information Technology Services (ITS) provides coordinated, centralized IT support in core IT services areas such as academic technologies, communication technologies, enterprise IT services and infrastructure, and IT security.

CU-Boulder students are able to take advantage of educational technology tools, fast network speeds, wireless network access around campus, residence halls with 100-megabit-per-second (Mbps) Ethernet jacks and/or wireless networking in every room, an extensive array of modern computing laboratories, online services, and innovative technology resources available in many classrooms. Personal computing accounts, issued to all computer-fee-paying students, provide access to a variety of technology services including e-mail, disk space on university servers, and secure access to Internet-based services.

A personal computer is strongly recommended for incoming students. Many students bring laptop computers and take advantage of the wireless service available across most of the campus. However, if bringing your own computer is not possible, there are dozens of computer labs available across campus equipped with a variety of personal computers and scientific workstations that are available for student use.

ITS's home page ([www.colorado.edu/its](http://www.colorado.edu/its)) contains a wealth of information about campus technology offerings and services including Getting Started With Campus Technology, security topics, IT policies and guidelines, computer lab information, and help documentation.

#### Support Services

ITS offers a wide variety of support services including a walk-in help center, free computing advising, seminars, workshops, and online help documents. The IT Service Center offers walk-in service Monday through Friday, 8:00 A.M.–5:00 P.M., and call-in and e-mail help Monday through Friday, 8:00 A.M.–7:00 P.M. The IT Service Center is located in the Telecommunications Center (on 18th Street, two buildings east of the University Memorial Center) and can be reached at **303-735-HELP** or [help@colorado.edu](mailto:help@colorado.edu).

ITS provides a no-cost, walk-in desktop support service for university and personally owned computers for all faculty, staff and students. The BugBusters have two walk-in locations: the Telecommunications Center and Norlin Information Commons. For additional information and hours, go to [www.colorado.edu/its/support/helpcenters.html](http://www.colorado.edu/its/support/helpcenters.html). Free lunchtime seminars and other hands-on computer workshops are provided for faculty, staff, and students to facilitate the incorporation of technology



into academic life. Information about IT-related training opportunities is available at [www.colorado.edu/its/training](http://www.colorado.edu/its/training).

### *Educational Technologies and Facilities*

The campus supports and encourages the use of educational technologies, including CULearn, CU-Boulder's online course tool, used by faculty and students, and available through [MyCUInfo.colorado.edu](http://MyCUInfo.colorado.edu).

Many CU-Boulder courses utilize “clickers”—devices similar to a TV remote control—to send information that is tabulated and displayed to the entire class on a projection screen. The system allows for active participation by all students and provides immediate feedback to the instructor and students about any misunderstandings in the material covered.

Staff members, assisted by student employees, work closely with faculty in over 100 technology-equipped classrooms. Each technology classroom and lecture hall contains, at minimum, a VCR, overhead projector, video projection unit (TV or data projector), and Internet connection.

The ATLAS Building, which opened in fall 2006, provides all faculty and instructors with the opportunity to use the latest instructional technologies in their teaching. Criteria for teaching in the ATLAS building include effective use of technology and distance collaboration.

The ITS Digital Media Services Center is a facility for producing digital media modules for instructional use. The center's staff provides both consultation and instructional support for scanning and processing images, editing digital video, authoring DVDs, and producing animations and illustrations. Both faculty and students are served by the center's high-tech facilities on the third floor of the ATLAS building. Details are available at [www.colorado.edu/its/graphics](http://www.colorado.edu/its/graphics).

### *Websites and Services*

The campus provides information services through an extensive set of websites. The CU-Boulder website ([www.colorado.edu](http://www.colorado.edu)) provides information on campus news and events, campus map, a to z department listing, parking and transportation, admission requirements and application, academic and research programs, job listings, and more.

### *Computing Labs*

ITS maintains more than 50 student computing labs, which house more than 1,400 systems and their peripherals. Facilities include instructional and general-use labs equipped with Windows-, Mac-, and Linux-based workstations. All are connected to the campus network. Some of the labs are focused on specific disciplines or applications, such as foreign language instruction, statistics, or graphics, but most are available for general-purpose use. In addition to the resources that ITS provides, a large number of departments support their own computing facilities for administration, special research, and instruction.

### *Personal Computer Maintenance*

Warranty and non-warranty service for Apple computers is available through PC Maintenance, located in The Buffalo Chip in the CU Book Store. Some services for other models, like data backup and hard drive repair, are also available. Customers requiring warranty service for models other than Apple should contact the manufacturer. The CU Book Store is located in the University Memorial Center and is open Monday–Thursday 8:00 A.M.–6:00 P.M., Friday 8:00 A.M.–5:00 P.M., and Saturday 11:00 A.M.–3:00 P.M. Call **303-492-6411** for more information.

### *Networks*

ITS is responsible for the major data communications networks on campus, which provide communications within the campus as well as gateways to national computing networks via the Internet. All students automatically receive computing accounts that provide access to campus networks, e-mail, and computing services. CU-Boulder offers wireless Internet coverage augmenting its wired network and offering mobile connectivity and network accessibility from varied locations throughout campus. Wireless access can be found in almost all buildings on campus, in popular campus life locations, and in most residence halls.

### *Student E-mail Policy*

E-mail is an official means of communication from CU-Boulder administrators and faculty to students. All CU students receive an official CU-Boulder e-mail address from the university. Students are responsible for checking their CU-Boulder e-mail on a frequent and consistent basis in order to stay current with university-related communications. The official e-mail address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use the official CU-Boulder e-mail addresses to contact students and provide important information. For more information on the student e-mail policy, visit [www.colorado.edu/policies/email.html](http://www.colorado.edu/policies/email.html). For general questions about CU-Boulder e-mail contact the IT Service Center (**303-735-HELP** or [HELP@colorado.edu](mailto:HELP@colorado.edu)).

### *Counseling and Psychological Services*

Services at the center are free and available to all CU-Boulder students. The center is a safe place to talk confidentially with a licensed counselor, psychologist, or social worker who understands and respects individual differences and needs. Therapists provide counseling, presentations, consultation, and outreach services to promote student academic success and healthy student development.

### *Counseling Services*

- **Individual counseling and therapy.** The center offers free counseling to individuals, couples, and families in order to meet personal, professional, cultural, academic, and career needs. Some concerns brought to the center include relationships, stress management, conflicts, trauma, sexual harassment, workplace issues, cultural identity, depression, anxiety, racism, suicidal thoughts, eating disorders, coming-out issues, and substance abuse.
- **Counseling in several residence halls** is provided on a part-time basis as well. Currently these include Kittredge and Williams Village.
- **Free groups and workshops** are offered on subjects such as performance anxiety, stress, surviving trauma, grief and loss, dissertation support, new to CU, relationships, and substance abuse.
- **Myers-Briggs Type Indicator and Strong-Campbell Inventory** are offered to individuals and groups for a small fee.

### *Consultations and Presentations*

Faculty, staff, and students are welcome to call in or walk in to talk to a counselor regarding students of concern Monday through Friday, 9:00 A.M.–4:00 P.M. Workshops on dealing with students of concern or other mental health issues are available to faculty and staff groups and classes.

Walk-in or phone-in consultations are available Monday through Friday from 9:00 A.M. to 4:00 P.M. without appointment. The office is located in Willard Administrative Center 134, 303-492-6766. Information is also available at [www.colorado.edu/sacs/counseling](http://www.colorado.edu/sacs/counseling).

### Center for Multicultural Affairs

The Center for Multicultural Affairs (CMA) has a long-standing commitment to diversity and multiculturalism and is staffed by a culturally-diverse team of university counselors and student mentors who assist students throughout their college careers. CMA is a resource and referral counseling center that works to increase the retention/persistence of all students. They also provide a welcoming environment, specialized programming, and confidential counseling. Moreover, CMA complements existing campus services by striving to increase opportunities for the university community to enhance understanding of the contributions made by diverse communities.

Programs offered at the Center for Multicultural Affairs include: Diversity Education Team (workshops, discussion groups, and seminars); First Generation Scholars; Parents as Partners; peer counseling; welcome celebrations and mentorship programs, and the White Antelope Memorial Scholarship. Contact CMA at Willard Hall 118, 303-492-5667, or [www.colorado.edu/studentaffairs/cma](http://www.colorado.edu/studentaffairs/cma).

### Disability Services

Disability Services' (DS) mission is to provide students with disabilities the tools, reasonable accommodations, and support services to participate fully in the academic environment. Furthermore, their mission is to promote an accessible and culturally sensitive campus through outreach and by building partnerships within the university community and beyond.

DS serves a diverse group of students with disabilities, i.e., learning disabilities, ADD/ADHD, psychiatric/psychological, traumatic brain injury, physical/systemic, blind/low vision, and Deaf/hard of hearing. All students requesting services and/or accommodations must submit documentation of a disability to DS. Documentation should meet the DS requirements found at the website below.

Support services are provided on an individual basis and include assistance with advocacy, academic advising, strategy development, study skills, campus and community referral, as well as an Assistive Technology Lab and Career Program for Students with Disabilities.

Reasonable accommodations are based upon a disabling condition that significantly impacts a major life function. Students may qualify for services even if documentation does not support the need for accommodations. Accommodations may include extended time on exams, interpreters, real-time captioning, note takers, materials in alternate format, and assistive technology.

The Assistive Technology Lab allows students with disabilities access to computer systems, information resources, and on-line services. The AT lab also provides alternate writing tools, access to print materials, and technological support to students, as needed.

**NOTE:** For any student struggling academically or questioning the presence of a disability, DS provides screeners at no fee.

Contact Disability Services at University of Colorado at Boulder, 107 UCB, Boulder, CO 80309, 303-492-8671, fax 303-492-5601, [dsinfo@colorado.edu](mailto:dsinfo@colorado.edu), or visit [www.colorado.edu/disabilityservices](http://www.colorado.edu/disabilityservices).

### Environmental Health and Safety

Environmental Health and Safety (EH&S) provides professional leadership and technical services in environmental stewardship, campus health issues, workplace safety, and regulatory compliance to the campus community through the following programs:

- **Environmental Compliance** helps ensure that the Boulder campus is in compliance with applicable environmental regulations through on-site inspections, training, and program review. EH&S staff investigate incidents and respond to issues involving air quality, water quality, health exposures, and protection of the environment.
- **Radiation Safety (Health Physics)** oversees the safe and responsible use of radioactive materials and radiation producing machines. Its staff investigates incidents, monitors research activity using radioisotopes, and initiates policy via the Radiation Safety Committee.
- **Hazardous Materials Management** manages the recycling, minimization, treatment, and appropriate disposal of hazardous materials, as well as educating the campus community in the handling of hazardous materials and promoting safety practices.
- **Asbestos and Lead Management** specializes in the inventorying, maintenance, and abatement of asbestos and lead building materials. Its staff works closely with building maintenance activities and campus projects to ensure the safe removal of asbestos and lead building materials.
- **Emergency Management** oversees the prevention, preparation, response, and recovery to all hazards on campus, coordinates the Emergency Management Operations Group, assists departments, colleges, and divisions in developing Business Continuity and Disaster Recovery Plans, and provides leadership to campus emergency response activities.
- **Environmental Management System (EMS)** is a pilot program within EH&S that guides the evaluation, prioritization, and coordination of EH&S programs. EMS works to maintain ongoing cycles of reviewing, planning, implementation, and continual improvement of CU-Boulder's environmental stewardship.
- **Biological Safety** facilitates compliance with applicable federal, state, and local environmental and occupational health and safety regulations through industrial hygiene practices, on-site inspections/surveys, technical evaluations, training, and program and activity reviews.

### Ombuds Office

The Ombuds Office provides confidential and informal assistance to any student, staff member, faculty member, or administrator who is experiencing conflict with another person or persons within the university community or who has concerns about university-related academic or administrative issues (e.g., decisions, services, responsiveness, etc.). Assistance provided includes conflict-related coaching, help with exploring options, mediation, information about campus policies and procedures, and referral to appropriate campus resources. The office does not give legal advice, conduct formal investigations, make or change administrative decisions, keep written records, or participate in formal proceedings (e.g., grievances, hearings, etc.). Visitors to the office wishing to formally notify the university about a concern are referred to the appropriate office or department.

For more information, contact the Ombuds Office, University of Colorado at Boulder, 112 UCB, Boulder, CO 80309-0112, 303-492-5077, or [www.colorado.edu/Ombuds](http://www.colorado.edu/Ombuds).

### Parking and Transportation Services (PTS)

All students are able to buy parking permits if they wish; however, campus parking is just not as convenient as living at home. Main Campus parking is available for a limited number of Main Campus residents. Many Main Campus residents are permitted in Williams Village lots. They use the Buff Bus shuttle for transportation between the Main Campus and Williams Village. Students who live off campus and commute are assigned to parking lots at the periphery of campus. Visit the website at [www.colorado.edu/pts](http://www.colorado.edu/pts) and click on Parking Permits/Student Permits for specifics about where you'll park relative to your housing assignment. Life at CU without a vehicle is good too: the CU-Boulder campus and the city of Boulder are accessible on foot, by bus (free with the Buff OneCard), and by bike.

**Parking Permits.** Those who park on campus frequently should buy a permit. All permits are sold online at [www.colorado.edu/pts](http://www.colorado.edu/pts).

**Permit Rates and Payment.** Permit rates are determined by proximity to one's residence or workplace. Semester rates range from \$106 to \$165.75; academic year rates (August–May) are double. Permits may be charged to student bills or credit cards. For information concerning summer permits, check the website. Fees are subject to change without notice.

**Visitor Parking.** The Euclid AutoPark, located just east of the UMC, provides visitor parking at an hourly rate. Visitors may also park at meters and pay stations on campus. Some lots that are permit-controlled during business hours become visitor lots weeknights and on Saturdays and Sundays for a small fee. Meters and pay stations require payment seven days a week between 7:30 A.M. and 5:00 P.M. Temporary permits are available at the customer service window at 1050 Regent Drive during business hours. An online map ([www.colorado.edu/pts](http://www.colorado.edu/pts)) shows all campus parking areas, and printed maps are available at 1050 Regent Drive.

**Bicycle Program.** Bicycles parked on campus must be registered with Parking and Transportation (\$10 fee, good as long as one owns the bike). Bicycles with valid registrations from other jurisdictions may be registered on campus at no charge. Register bicycles at the bike station near the UMC and Euclid AutoPark the week before fall semester and throughout each semester. Registration entitles a bike owner to services provided by the bike station including repair assistance, use of tools, and loaner bikes. Call 303-735-2705 for more information. Registration is also the link between the owner and the bike, making it possible to contact an owner whose stolen bike was recovered.

**Parking and Traffic Regulations.** Complete CU-Boulder parking and traffic regulations may be obtained at the Parking and Transportation office, 1050 Regent Drive, Boulder, CO 80309-0502 and online. Call 303-492-7384 for more information.

### Photo ID/Campus Card Program

The Buff OneCard is the official CU-Boulder student ID to be used during a student's career at CU-Boulder. The card is required as verification of eligibility for many student privileges, including access to the Student Recreation Center, all campus libraries, printing, Wardenburg Health Center, housing dining centers, athletics events, and local and regional RTD buses.

The Buff OneCard also offers a number of convenient, optional programs such as the Buff One banking program that turns the card into an ATM/debit card that accesses accounts set up with the Elevations Credit Union, and the Campus Cash program that allows students to make purchases at a number of housing dining areas. For more information about these and other programs, call the Campus Card office at 303-492-0355 or visit [www.buffonecard.com](http://www.buffonecard.com).

Lost or stolen cards must be reported immediately by calling 303-492-1212 to have the card deactivated, or via the Web at [www.buffonecard.com](http://www.buffonecard.com). Both methods are available 24 hours a day. A replacement Buff OneCard may be purchased for \$25 at the Campus Card office.

The Campus Card office is located in the Department of Housing, 182 Willard and is open 8:00 A.M.–5:00 P.M., Monday–Friday. Office hours and card fees and prices are subject to change.

### Planning, Budget, and Analysis

The Office of Planning, Budget, and Analysis is responsible for directing and supporting campus budgeting, planning, and management through oversight of budget services, institutional research, and planning processes; providing institutional analyses, assessments, and information for decision support; supporting the development of operating budget requests; maintaining a balanced and fiscally healthy annual budget; providing assistance to campus units on the use or development of management information and technology; and serving as the liaison with the system office and the Colorado Commission on Higher Education (CCHE) on planning issues and requirements. The office also administers the faculty course questionnaires (FCQs), which give students the opportunity to evaluate their courses and instructors. For more information, call 303-492-8631.

### Speech, Language, and Hearing Center

The Speech, Language, and Hearing Center provides a complete range of speech, language, and learning services to students, faculty, staff, and members of the community. Services include assessment and intervention programs for articulation, voice, stuttering, and language and learning problems. Programs for children and adults with communication challenges related to deafness or hearing loss, learning disabilities, developmental delays, strokes, head injury, and progressive neurological problems are available on a group and/or individual basis.

The center also houses the Child Learning Center with an inclusive (typically developing children and children with communication challenges associated with medical or developmental conditions) preschool program for children ages 18 months to five years, parent education and support programs in Spanish and English, and educational outreach services to the Boulder community to enhance quality of child care and preschool experiences for young children. The summer camp programs at the center for children with autism, developmental delays, and reading challenges are intensive ranging 2–3 weeks in length. For more information about programs and services at the center, view the SLHS website at [www.slhs.colorado.edu](http://www.slhs.colorado.edu) or contact the center at 303-492-5375. Scholarship funding is available for children with language and learning problems through the Scottish Rite Care Partnership program. Contact Kathleen Pastuer (303-492-3066) for applications for funding.

The Marion Downs Hearing Center, formerly housed at the Speech, Language, and Hearing Center, is now housed at 350 Broadway in Boulder and provides audiology services and pro-

cedures including routine and advanced assessments of hearing, comprehensive hearing aids and assistive listening device services, and cochlear implantation consultation and support. Children are then referred to the Speech, Language, and Hearing Center for rehabilitative services. Contact the Marion Downs Hearing Center at **720-848-2800** for scheduling of appointments.

### Student Academic Services Center

The Student Academic Services Center (SASC) offers academic support services to help students improve their learning potential.

#### *Academic Excellence Program*

The Academic Excellence Program offers academic, logistic, and counseling assistance to qualified students wishing to improve their academic success. Program activities include group and individual workshops, tutor-supervised study halls, and assistance with topics including note taking, reading strategies, test preparation, career exploration, and time management. Undergraduate students who are the first generation in their family to receive a four-year college degree, are low income, and/or have a physical or learning disability may be eligible to participate.

#### *Ronald E. McNair Postbaccalaureate Achievement Program*

The McNair Scholars Program prepares CU students for doctoral study. Students who are U.S. citizens or legal residents and qualify by federal guidelines as low income and first generation, or as members of populations underrepresented in graduate school may apply. Twenty students are selected each year to participate in both academic year and summer activities. Benefits include: a stipend up to \$2,800 for completing a nine-month research project; summer expense support; faculty and graduate student mentoring; journal publication and national conference research presentation; intensive GRE prep sessions; academic skills training; credit-bearing seminars; positioning for graduation with honors; graduate school application assistance; and preferred status to obtain McNair-specific application fee waivers and fellowships from more than 150 graduate schools nationwide.

Visit the office located in Willard 400 or call **303-492-3482** for program information. An online application is available at [www.colorado.edu/sasc/mcnair.html](http://www.colorado.edu/sasc/mcnair.html).

#### *McNeill Academic Program*

The McNeill Academic Program offers small classes, workshops, extracurricular activities, personal contact with university staff and faculty, and membership in a community of motivated students. Participation continues throughout a student's enrollment at CU-Boulder. The program accepts students who participated in the University of Colorado's Pre-Collegiate Development Programs, as well as other students identified by the admissions office, participating in various scholarship programs, referred by university staff and faculty, or self-referred, who would benefit from participation in an academic program with high expectations and a supportive professional staff.

#### *Support Services*

SASC provides a range of services tailored to meet the specific academic and personal needs of eligible students. These include alternative core curriculum courses in math and writing, tutorial support and academic skills development in key subject areas, and tutorial referral in a wide range of subjects. Academic specialists provide guidance and assistance in meeting students' academic goals.

Students interested in these services can come to Willard 386 or call **303-492-1416**. The e-mail address is [SASC@colorado.edu](mailto:SASC@colorado.edu) and the website is [www.colorado.edu/sasc](http://www.colorado.edu/sasc).

### Veterans Educational Benefits

The Veterans Educational Benefits Office is part of the Office of Financial Aid and helps eligible students apply to the Department of Veterans Affairs for education benefits. As a condition of receiving benefits, prospective students must be accepted to a degree program at CU-Boulder or acceptance must be imminent.

CU-Boulder students receive VA education benefits under the following programs:

- **Veterans Educational Assistance Program (VEAP), Chapter 32.** Students must have entered active duty on or after January 1, 1977, and before July 1, 1985, and have participated in this program while in the service.
- **Chapter 30, Montgomery GI Bill, Active Duty.** Students must have entered active duty on or after July 1, 1985, and participated in the program while in the service by contributing \$1,200. Also eligible are those veterans who entered active duty before January 1, 1977, and who served continuously on active duty through June 30, 1988 (or June 30, 1987, with at least a four-year obligation to the Selected Reserve).
- **Dependents' Educational Assistance Act, Chapter 35.** Children and spouses of 100-percent-disabled or deceased veterans may qualify for this benefit. Applicants must provide the veteran's VA file number and a copy of their birth certificate or marriage license to the Veterans Educational Benefits Office in order to apply for these education benefits. Those students eligible for social security benefits under the Restored Entitlement Program for Survivors (REPS) should contact the local Department of Veterans Affairs regional office.
- **Chapter 1606, Montgomery GI Bill, Selected Reserve.** Students may be eligible if they enlisted, reenlisted, or extended an enlistment in the Selected Reserve or National Guard for a period of six years beginning on or after July 1, 1985. Each student must provide the Veterans Educational Benefits Office with a Notice of Basic Eligibility, DD-2384, from the reserve or guard unit.
- **Chapter 1607, Reserve Educational Assistance Program (REAP).** Students may be eligible if they are members of the National Guard or Reserves of the Armed Forces and were called to active duty for a period of 90 days or more after September 11, 2001. Eligibility for this program is determined by the Department of Defense and the Department of Homeland Security, but payment of benefits will be administered by the Department of Veterans Affairs.
- **Disabled Veterans, Chapter 31.** Veterans may be entitled to vocational rehabilitation benefits of tuition, fees, books, and a monthly stipend if they meet the following conditions: they were discharged from the service under other-than-dishonorable conditions; they have a service-connected disability for which they are receiving or could elect to receive VA compensation; and the Department of Veterans Affairs determines they need rehabilitation services and assistance to overcome an employment handicap or to improve their capacity for independent living in their family and community. Interested persons should contact the Department of Veterans Affairs Vocational Rehabilitation at **303-914-5550**.

- **Chapter 33, Post 9/11 Veterans Education Assistance.** The Post-9/11 GI Bill is a new benefit providing educational assistance to individuals who served on active duty on or after September 11, 2001. Payment for this new benefit will be applicable beginning August 1, 2009. No payments can be made under this program for training pursued before that date. To be eligible, students must have served at least 30 days of continuous active duty service after September 10, 2001, and have been discharged due to a service-connected disability, or served an aggregate of 90 days of active duty service after September 10, 2001, and in general, have been honorably discharged from the Armed Forces or continue to be on active duty. Additional discharge classifications may be eligible as well. Please see Veterans Educational Benefits or [www.gibill.va.gov](http://www.gibill.va.gov) for additional information.

**Payment.** Students may request advance payment by completing the proper forms at the Veterans Educational Benefits Office at least 56 days before the start of a term (they must not have received benefits in the 30 days preceding the term). It is recommended, however, that requests for advance pay be submitted at least 60 days prior to the start of the term to allow for processing at the VA Regional Office and to ensure timely payment. The advance paycheck for the first month (or partial month) and the succeeding month is delivered to the Veterans Educational Benefits Office. The next educational benefit check and subsequent checks are sent to the student's address or bank account via direct deposit.

The office has staff to assist students with applying for VA education benefits. Financial aid counseling is also available. The office is located in the Office of Financial Aid, Regent Administrative Center 205. For information, call **303-492-7322** or visit [www.colorado.edu/finaid/veteran.html](http://www.colorado.edu/finaid/veteran.html).

## Wardenburg Health Center

Wardenburg Health Center provides a wide range of services including medical, women's health, mental health, sports medicine, and health education. Charges and fees are associated with most medical services. Many health education and outreach programs are provided free of charge. The physicians at the health center are board-certified, and Wardenburg Health Center is accredited by the Accreditation Association for Ambulatory Health Care (AAAHC).

Wardenburg Health Center is located at the corner of 18th Street and Broadway on campus. The mailing address is Wardenburg Health Center, University of Colorado at Boulder, 119 UCB, Boulder, CO 80309-0119.

For more information, go to [www.colorado.edu/healthcenter](http://www.colorado.edu/healthcenter), or call **303-492-5101**. Wardenburg Health Center is a service of UCSU.

### Fees for Services

Charges and fees are associated with most medical services such as medical clinic, women's health services, psychological health and psychiatry, and sports medicine. For services rendered that are not covered by one of the university health plans, the student is expected to pay at the time of the service with cash, check, or credit card (VISA, MasterCard, or American Express).

### Services Offered for Free

Student fees support the Community Health Resource Center in UMC 411, which offers cold care kits, HIV testing, chair massages, one-on-one counseling, and resources and education on healthy relationships, general wellness, sexual health, and more.

Wardenburg's Sports Medicine department offers the Musculoskeletal Injury Clinic (MSK) which provides screenings for minor injuries involving muscles and joints by a physical therapist.

### How to Access Wardenburg Health Center

Appointment times are available for medical, mental health, sports medicine, and women's health services. However, urgent medical or mental health services are available for those who cannot wait for an appointment due to the nature of the illness, injury, or personal crisis.

The Community Health Resource Center, HIV testing, and the Musculoskeletal Injury Clinic (MSK) are available on a walk-in basis during designated hours. For more information, call **303-492-5101**.

### Hours of Operation

(subject to change; hours change during holidays and breaks)

#### Fall and Spring Semesters

Monday–Thursday*	8:00 a.m.–6:00 p.m.
Friday	8:00 a.m.–5:00 p.m.
Saturday	9:00 a.m.–2:00 p.m. (Medical Triage and Psychological Health only)
Sunday	Closed

\* Thursdays—Medical Clinic opens at 9:00 a.m.

#### Summer Session

Monday–Friday 8:00 a.m.–5:00 p.m.

### Emergencies

When Wardenburg is closed, the nearest 24-hour emergency service is Boulder Community Hospital Emergency Room (**303-440-2273**), on the corner of North Broadway and Balsam. Payment for such services is the student's responsibility.

### Health Records

A confidential health record is created for students after their first visit to the health center. This health information cannot be released without written consent unless mandated by law. (For students under 18 years of age, parents(s) or legal guardian(s) must sign a "Consent for Treatment" form which is kept in the health record file.) Medical and mental health records are not included in the general university record system. Health records are maintained in compliance with federal and Colorado laws and are destroyed in a confidential manner after 10 years. For more information, call **303-492-2068**.

### State/CU-Boulder Requirements for Immunizations

**Tuberculosis (TB) Testing for New International Students.** The university requires incoming (new) international students from countries where the incidence of TB is high to be tested for TB. The University of Colorado Tuberculosis Information and Screening form must be completed and provided to the Immunization Office at Wardenburg Health Center by September 1, 2010, for fall 2010 and February 4, 2011 for spring 2011. The health center provides TB testing at minimal cost. If your test results are positive and treatment is needed, care is available through the Colorado Department of Health. The immunization form may be faxed to **303-492-1014**, mailed, or delivered in person to the Immunization Office, located in the Wardenburg Health Center. To download the screening form or for more information, see [www.colorado.edu/healthcenter](http://www.colorado.edu/healthcenter) or call **303-492-2005** or **303-492-8217**.

**Measles, Mumps, and Rubella Immunization Requirements.** All degree-seeking students (including transfer and graduate students) born on or after January 1, 1957, must provide immunization documentation for two rubeola (measles), two rubella (German measles), and two mumps immunizations. The completed state of Colorado Certificate of Immunization for College Students form must be turned in to the Immunization Office at Wardenburg Health Center by September 1, 2010, for fall 2010 and February 4, 2011, for spring 2011. If the form is not turned in by then, the university will place a “hold” on the following semester’s registration, and a fee of \$25 will be assessed. A signed/stamped copy of the student’s immunizations may be obtained from the student’s physician, high school, previous university records, or military records and attached to the form. Immunizations are available at cost through Wardenburg on a walk-in basis. Medical, religious, and personal exemptions are allowed by law. The immunization form may be faxed to **303-492-1014**, mailed, or delivered in person to the Immunization Office, located in Wardenburg Health Center. To download the Certificate of Immunization for College Students form or for more information, see [www.colorado.edu/healthcenter](http://www.colorado.edu/healthcenter) or call **303-492-2005** or **303-492-8217**.

## Campus Policies

### Academic Integrity

A university’s intellectual reputation depends on maintaining the highest standards of intellectual honesty. Commitment to those standards is a responsibility of every student, faculty, and staff member on the University of Colorado at Boulder campus.

#### Honor Code

A student-run Honor Code was instituted on the Boulder Campus in 2002. The intent of the Honor Code is to establish a community of trust where students do not plagiarize, cheat, or obtain unauthorized academic materials. An honor code council collaborates with the colleges and schools in addressing allegations and instances of academic dishonesty and in assisting to educate all members of the university community on academic integrity issues.

Breaches of academic honesty include but are not limited to cheating, plagiarism, and the unauthorized possession of examinations, papers, computer programs, as well as other class materials specifically released by the faculty.

A student accused of academic dishonesty will either accept the accusation made by a faculty member or request a hearing before a student panel, who will make a decision on the accusation of academic dishonesty. In addition to academic sanctions imposed by the faculty, students found responsible for academic dishonesty also face consequences from the honor code council ranging from probation, including attending a mandatory ethics seminar, suspension, to expulsion from the campus. More information about CU-Boulder’s Honor Code may be found at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

The following terms are clarified for the benefit of all members of the university community.

#### Cheating

Cheating is defined as using unauthorized materials or receiving unauthorized assistance during an examination or other academic exercise. Examples of cheating include: copying the work of another student during an examination or other academic exercise (includes computer programming), or permitting another

student to copy one’s work; taking an examination for another student or allowing another student to take one’s examination; possessing unauthorized notes, study sheets, examinations, or other materials during an examination or other academic exercise; collaborating with another student during an academic exercise without the instructor’s consent; and/or falsifying examination results.

#### Plagiarism

Plagiarism is defined as the use of another’s ideas or words without appropriate acknowledgment. Examples of plagiarism include: failing to use quotation marks when directly quoting from a source; failing to document distinctive ideas from a source; fabricating or inventing sources; and copying information from computer-based sources, i.e., the Internet.

#### Unauthorized Possession or Disposition of Academic Materials

Unauthorized possession or disposition of academic materials may include: selling or purchasing examinations, papers, reports or other academic work; possessing unauthorized solutions, instruction manuals, or texts; taking another student’s academic work without permission; possessing examinations, papers, reports, or other assignments not released by an instructor; and/or submitting the same paper for multiple classes without advance instructor authorization and approval.

#### Academic Program Discontinuance

In the event a degree program is discontinued, students currently enrolled in the program have a four-year period in which to complete their degree requirements. This four-year period starts at the end of the academic year in which the Colorado Department of Higher Education (CDHE) takes action to discontinue the program. No new or returning students will be admitted into a discontinued degree program. Students not completing the degree requirements in the four-year period are not permitted to receive the discontinued degree. In such cases, credits accumulated may be applied to the overall number of credits required toward graduation, but the student must seek the advice of their college or school to determine how these credits might apply to a new degree program.

#### Alcohol and Other Drugs Program

In order to create the best possible environment for teaching and learning, the University of Colorado at Boulder affirms its support for a responsible campus policy that addresses the inappropriate use of alcohol and other drugs.

The university complies with all federal, state, and local laws concerning alcohol and illegal drugs. CU-Boulder students are responsible for acquainting themselves with the laws and university policies regarding alcohol and illegal drugs. University policies regarding alcohol consumption and illegal drug use are described in several publications: *Students’ Rights and Responsibilities Regarding Standards of Conduct and Alcohol and Drug Policy*, available in the Office of Judicial Affairs; *A Guide to Residence Hall Living*, available at the Department of Housing; and *Ralphie’s Guide to Student Life*, distributed online to new and continuing students.

For more information on the CU-Boulder Alcohol and Other Drugs Program, call **303-492-5703** or visit [www.colorado.edu/alcohol](http://www.colorado.edu/alcohol). Wardenburg Health Center provides individual and group counseling for students with substance abuse problems. They can be reached at **303-492-5654**. For information regarding poli-



# College of Architecture and Planning

*Mark Gelernter, dean*

314 UCB • phone: 303-492-8010 • fax: 303-492-6163  
college website: [www.cudenver.edu/academics/colleges/architectureplanning](http://www.cudenver.edu/academics/colleges/architectureplanning)

**T**HE COLLEGE OF ARCHITECTURE AND PLANNING at the the University of Colorado (at both the Boulder and Denver campuses) prepares students for careers in architecture, urban and regional planning, landscape design, and urban design. The college offers undergraduate and graduate education in these fields, and its professional graduate programs are accredited by the National Architectural Accrediting Board, the Landscape Architecture Accrediting Board, and the Planning Accrediting Board.

The College of Architecture and Planning's undergraduate program is offered on the Boulder campus in an environment ideally suited to the needs of undergraduate students. With a diverse faculty committed to excellence in teaching, research, scholarship, and creative and professional work, the college provides students with a varied range of learning opportunities.

Many students intending to enter the design and planning professions complete the college's undergraduate degree at CU-Boulder as preparation for entry into the college's graduate-level professional programs at the University of Colorado Denver Downtown Campus, where they may receive advanced standing in those graduate programs as an outcome of the work they have done in the ENVD program. Graduate-level professional programs are offered by a wide range of schools and programs nationally, and students graduating from the college's undergraduate program often receive advanced standing in those graduate programs as a result of the courses they will have completed as undergraduates in Boulder.

## The College's Vision

The faculty has adopted a vision for the college that focuses on the concept of Integrative Design. This vision asserts that the creation of meaningful and beautiful environments involves:

- focusing on real world relevance, stressing technical, environmental, economic, social, cultural, aesthetic, and ethical concerns;
- creating and using a knowledge base for design and planning decisions;
- fostering a multidisciplinary culture of individuals who are each expert in one of the core designing and planning disciplines; and
- seeking and supporting a rich diversity of ideas and people to support the diverse communities served.

In seeking a match between the college's core competencies and the design and planning challenges in the fast-growing Denver metro area and Western region, the college faculty are focusing on three themes:



- **sustainable urbanism:** extending studies of the forces that shape the contemporary urban environment; studying the design parameters and processes that can be used to develop sustainable infrastructures for urban, suburban, and rural life (Those infrastructures also support effective social, community, and intrapersonal interactions in the larger and more complex environments of the city and the country.); applying the emerging concepts of contemporary urbanism, critical regionalism, eco-design, landscape urbanism, and ecological planning to the complex task of designing and planning environments that will accommodate rapid growth in the cities of the American West.
- **healthy environments:** extending understanding of the different factors, forces, and concerns that shape environments that are healthy, appropriate, beneficial, and sustainable. (Healthy environments are environments designed to restore the important balance between people and their natural, cultural, social, and designed settings. They are designed collaboratively by clients, users, and designers using processes that are participatory, inclusive, and transparent. They embrace feedback as a means for continuous refinement and improvement resulting in design proposals that are mindful and that maximize human potential and health while minimizing the use of resources and restoring natural systems.)
- **historic preservation:** extending the use of design history, theory, and criticism to enhance understanding of the methods, techniques, and technologies that support the preservation of important buildings, neighborhoods, and districts, and the conservation of unique natural and cultural landscapes. (The case study is used as a method for studying the history and theory of the designed environment. It is also used to inform and guide the design process as it deals with the increasing demand for the preservation and conservation of the designed environment, and in the design of recycled spaces and re-used settings.)

This vision and these signature themes position the college to confront the significant challenges in the design and planning of the built environment that will affect the design professions in the next few decades. A common concern affecting each of these themes is that of the impact of emerging models of design praxis that exploit the effects of digital technologies, methods, and techniques that have the potential to radically transform the way we represent, model, and produce complex environments through the interaction of digital imaging technologies, 3-D visualization techniques, rapid prototyping, and computer-enhanced fabrication.



## The Design Professions

Students thinking about studying design in an undergraduate setting as a way to prepare for a career in one of the design professions should have a strong overall high school academic background, including four years of English and at least three years of math, natural science (including physics and/or biology), and social science. Extra course work in math, social studies, and the arts and humanities is recommended. Students considering transfer into the College of Architecture and Planning from one of the other colleges or schools on the Boulder campus are encouraged to explore its curricula by enrolling in one of the introductory core courses before applying for entry into the program by intra-university transfer (IUT). IUT students must complete ENVD 1004 or ENVD 1104 (with a grade of B or better) to be eligible for admission to the college.

The discipline of design and its fields of architecture, planning, and landscape architecture deal with formulating solutions to many of the problems people face in their homes, communities, cities, and geographic regions. Architecture focuses on the design of buildings and the spaces between buildings, while planning is concerned with the larger scale of neighborhoods, cities, and regions. Landscape architecture focuses on both of these scales.

The college's undergraduate program, located on the Boulder campus, offers the only pre-professional education in the fields of architecture and planning in the state of Colorado. Graduate professional degrees in architecture, landscape architecture, urban and regional planning, and urban design are offered by the college on the university's Denver Campus. The college's undergraduate program is unique in the Rocky Mountain region, offering pre-architecture, pre-planning, and pre-landscape architecture curricula within the context of a broad, interdisciplinary design education.

To prepare for graduate professional study in architecture, landscape design, or planning/urban design, students may choose an undergraduate emphasis in one of these disciplinary areas or in environmental design. An individually structured emphasis in design studies is also available. There are also a range of other upper-division options within the emphases. These allow students to use their available electives to focus their studies in particular areas of interest. All five of these emphases—architecture, environmental design, landscape design, planning/urban design, and design studies—lead to the award of the bachelor of environmental design degree (BEnvd) as preparation for entry into graduate and professional degree programs and the workplace.

## Undergraduate Program

The college has taken a broad and integrated view of the design professions in developing its undergraduate curriculum and emphases. In recent years the problems and opportunities facing the design professions have changed dramatically. These changing conditions demand a broader educational experience than the individual professions traditionally have supplied.

To prepare students for these conditions, the college asks students to take a wide range of courses in the humanities, the arts, and the natural and social sciences so that they can view the world and contemporary culture from a variety of viewpoints.

Unlike undergraduate education in many other fields, students in architecture, planning, and design learn by doing. They experience design under the guidance of the college's exceptional faculty, and from practicing designers in the Denver/

Boulder metropolitan area. From the first day of the freshman year, students actively integrate and synthesize the knowledge gained in lectures and related course activities in their hands-on design classes.

The college provides required core courses throughout the curriculum in which students from all design disciplines study shared problems together. Architects, landscape architects, urban and regional planners, urban designers, technologists, and environmental designers need to understand each other's perspectives, and increasingly work together to find solutions to the complex issues involved in the design of the built environment.

The undergraduate program in environmental design promotes the development of a body of knowledge that allows each student to understand and appreciate:

- the major theoretical perspectives used to inform the way we design our physical environments and the significance of the designed environment in the evolution of human culture;
- the different methodologies and processes used to give shape to our spaces, buildings, gardens, neighborhoods, towns, cities, and landscapes;
- the complex interactions that take place between the physical, ecological, social, cultural, behavioral, and historical factors that influence the form and quality of designed environments;
- the ethical perspectives that inform the way we work to design environments and settings that are healthy, sustainable, appropriate, and beneficial; and
- the social, cultural, historical, and professional contexts within which environmental design is learned, practiced, and perfected.

In addition, the program supports the development of a range of methods and practices that encourages students to:

- explore and use the design process as the unique way of thinking used to give shape and form to the designed environment, and to realize its value as the common process that architects, planners, and designers use to effect appropriate change in the designed environment;
- effectively and creatively design environments and settings—spaces, buildings, gardens, neighborhoods, towns, cities, and landscapes—using appropriate theories, precedents, methods, tools, and technologies;
- use verbal, visual, and written materials to communicate design intentions and environmental outcomes so that students can work effectively as interns and professionals in the different fields that make up that group recognized as the design professions.

For information on the college's undergraduate program see [www.colorado.edu/catalog/catalog10-11/architecture](http://www.colorado.edu/catalog/catalog10-11/architecture).

## Facilities

Facilities for the college's programs in Boulder are provided in the Environmental Design building. The administrative and faculty offices, conference rooms, lecture rooms, and exhibit spaces are located on the first floor of the building.

The Visual Resource Center with its photo and portfolio labs and image collections supplement the design studios, which are located on the second and third floors of the building. Studio space is provided for all students during the academic semesters, and is accessible on a 24/7 basis. Students in the lower-division

studios and recitations typically use shared desks in the second floor studio, while upper-division studios are given access to individual desks and partitioned studio spaces in the third floor of the ENVD building and at the new center for Innovation and Creativity (CINC) facility.

Beginning and advanced computer facilities, including scanning, plotting, and printing labs, are available to students in the building. A specialized digital simulation lab on the third floor allows students to explore the cutting-edge field of digital visualization/production.

The college also offers its students access to specialized workshop, computer, and studio facilities that focus on the use of advanced technologies for design visualization, production, and simulation in the CINC facility on the CU-Boulder East Campus.

## Careers in the Design Professions

The college offers its undergraduate students access to unique professional opportunities through its combination of undergraduate and graduate curricula. The Boulder BEnvd degree, when combined with the three-and-one-half year Denver MArch, the two-year MURP, or three-year MLA degrees, offers students access to an accredited professional education in architecture, urban, and regional planning, or landscape architecture. ENVD students generally receive advanced standing in those graduate programs as an outcome of the work they have done in the ENVD program, and this allows them to complete the graduate degree in a shorter time—normally three to four semesters in graduate planning programs, and four to five in graduate architecture and landscape architecture programs.

### Architecture

The National Architectural Accrediting Board, which is responsible for the accreditation of all professional architecture programs in the United States, requires that accredited architecture programs publish the following statement:

“In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards. Master’s degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.”

The BEnvd degree awarded by the college at the end of four years of study is not recognized by the NAAB as an accredited professional degree. The BEnvd degree may be combined sequentially with a NAAB accredited master of architecture degree program to become an accredited professional education in architecture as defined by the NAAB. In this sequential program of study, students completing the BEnvd will normally be asked to complete a minimum of four semesters of additional course work (60 hours of credit) after admission into an accredited MArch program, either on the college’s Downtown Denver Campus, or in one of the other NAAB accredited graduate programs nationally.

### Planning

The practice of planning is not currently licensed in most states. Professional membership and certification is overseen by the American Planning Association (APA) and the American Institute of Certified Planners (AICP). Degrees in the field are accredited by the Planning Accreditation Board (PAB) of the Association of Collegiate Schools of Planning.

Although students interested in entry-level positions in planning may find the BEnvd degree adequate, an advanced degree (master’s or PhD) is highly desirable and advisable. Students primarily interested in professional practice should obtain a master’s degree in urban planning, in urban and regional planning, in urban planning and community development, or in urban design. Students interested in teaching or research in planning should complete a PhD.

Students from the undergraduate program who continue their studies in the graduate professional planning program in Denver are given advanced standing when accepted into the program. Copies of the policies relating to advanced standing are available in the college office. Though the amount of advanced standing received is directly related to the specific course work completed in the undergraduate program, undergraduate planning emphasis students who continue in the graduate planning program typically receive between 9 and 15 semester hours of credit, and complete master’s-level graduate studies in two or three semesters.

### Landscape Design

The College of Architecture and Planning is in the process of implementing a separate emphasis major in landscape design at the undergraduate level. While that is being designed and implemented, the college is offering a structured option in landscape design within the design studies emphasis. The landscape architecture program offers a graduate professional degree (the Master of Landscape Architecture or MLA) on the downtown campus of UC Denver. Undergraduates who complete the landscape studies option are prepared for entry into the UC Denver MLA program or other graduate-level landscape architecture programs offered elsewhere. Advanced standing in that graduate program is available to students who complete the landscape architecture related courses as a part of their landscape design emphasis in the ENVD degree program.

### Design Studies

There is an increasing demand in the design, construction, and development industries for people who combine an understanding of design with a specialized understanding of related fields like computing, management, finance, or marketing. Some students may use the design studies major as general preparation for graduate study in any number of academic fields that are also concerned with the design and planning of the built environment, including anthropology, geography, sociology, psychology, historic preservation, and architectural, urban, and environmental history. Other students may use this emphasis to prepare for further graduate study in a professional field related to architecture, landscape architecture and planning, including business, law, journalism, public administration, product design, and digital design.

As the design studies curriculum is individually tailored to each student, students in this emphasis major must outline and receive approval of their individual course plan by a faculty sponsor and the college dean’s office before entering the design studies emphasis. Participants in this emphasis are expected to attain a competent level of understanding and skill in

architecture, landscape design, or planning. Additionally, they are expected to attain a high level of understanding and skill in one specialized aspect of these fields. Such specializations might include computer applications, resource management, housing policy, environmental psychology, history of architecture, or building systems analysis. In support of their specialization, students are further expected to attain a competent level of understanding of a relevant cognate field outside the college (e.g., anthropology, civil engineering, business, or fine arts).

Students in the design studies emphasis take core courses within the college and general requirements outside the college in parallel with the architecture and planning emphases. Additionally, design studies students must complete foreign language courses through level two (second-year level in high school, or second semester at the college level). A minimum of 30 hours of course work must be completed after official approval of entry into the design studies emphasis, and the 30-hour residency requirement in this emphasis is not waived under any circumstances.

## Study Abroad

The College of Architecture and Planning and the Office of International Education urge design students to participate in one of the various study abroad programs offered for university credit. Plans for an expansion of study abroad opportunities are currently being considered, and will be coordinated by and offered through the Office of International Education. These immersion semesters are offered to upper-division undergraduate students. The study abroad program provides an academically challenging academic and cultural experience with extensive local support.

The University of Colorado at Boulder is a coordinating institution for DIS, Denmark's international study program at the University of Copenhagen. DIS offers semester- and year-long programs in architecture and design. Taught in English, the DIS program offers advanced design studio and related courses in addition to guided travel and study opportunities in other European nations, including the former Soviet Union. For more information about the DIS program, contact the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO, 80309-0123, 303-492-6016, or at [www.colorado.edu/oie](http://www.colorado.edu/oie).

Each summer, faculty of the college offer course work abroad through the University of Colorado Denver. In recent years, sites have included Rome and Beijing. In addition to these sites, for the past seven summers the college has been offering an integrated urban design studio in Turkey. These courses offer students an opportunity to study the process of design in another culture and to examine their own perceptions and attitudes toward design.

## College Lecture Series

The college's lecture series enables students and faculty to meet people whose work significantly contributes to the different fields that make up the design professions in America. All students registered in the College of Architecture and Planning attend convocations and special lectures throughout the year. In addition, the college sponsors an annual lecture series, with lectures at both the Boulder and Denver sites. Other professional organizations and design-related institutions in the metro area also sponsor lectures and events that are open to the college's students.

## Academic Excellence

### Recognition of Scholarship

As a professionally oriented school, the College of Architecture and Planning provides an atmosphere for study and creative investigation in which the attainment of quality is held in the highest esteem. In recognition of high scholarship and professional attainment, the college grants honors at graduation in two categories: honors and special honors. Scholarships, prizes, and awards are given to outstanding students and faculty on an annual basis.

### Honors at Graduation

Students achieving a grade point average of 3.500 to 3.740 (honors) and 3.750 to 4.000 (special honors) are recognized at commencement. Honors are based on course work completed at the University of Colorado.

### Scholarships, Loans, Awards, and Prizes

A wide range of scholarships, prizes, and other awards are available to the college's ENVD undergraduate students. They are sponsored by the college, the campus, the professions, and other foundations and donors. A list of available scholarships and awards, together with application information and the application schedule for all scholarships and awards, is published at the beginning of the spring semester each year, and is posted on bulletin boards in the ENVD Building and on the college website.

In addition to these scholarships, interested students may participate in faculty-student research projects funded by the Summer Undergraduate Research Experience (SURE) and by the Undergraduate Research Opportunities Program (UROP) programs, or in other research projects funded by one of the college's five research centers.

## Academic Standards

### Student Rights and Responsibilities

The College of Architecture and Planning is part of an academic community whose mission requires an open learning and working environment for students, faculty, staff, and administrators. An open learning and working environment values and protects individual dignity and the integrity of human relationships, and is based upon mutual trust, freedom of inquiry, freedom of expression, and the absence of intimidation and exploitation. Any infringement upon these freedoms and rights may be cause for review by the college or by other university offices. Undergraduates in the College of Architecture and Planning are subject to the policies and procedures governing student rights and responsibilities published in this catalog. Please refer to the relevant sections outlining explicit policies governing issues of sexual harassment and discrimination, and to review the full code of student conduct.

### Ethics and Academic Dishonesty

Students in the College of Architecture and Planning are subject to the Boulder campus Honor Code and are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Any act of academic dishonesty may receive sanctions from individual faculty and will also be reported to the Honor Code Office. For a full description of Honor Code expectations and policies please refer to the Honor Code section of this catalog or to [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

## GPA Requirements, Probation, and Scholastic Suspension

A student must achieve a grade of C- or better in all courses applied toward graduation requirements, excluding general electives. General electives that receive a minimum grade of D- may be credited toward the degree if the student has maintained a minimum cumulative grade point average of 2.000.

As a general rule, students who fail to meet the minimum cumulative grade point requirement (2.000) are permitted to continue their studies on a probationary basis during the following semester. Scholastic records of students are reviewed as soon as possible after the close of the probationary semester, and students are informed in writing if they are to be suspended.

When a student is suspended, the reasons for the suspension are recorded and placed in the student's file. The student is asked to define the problems and draft a plan for dealing with them in consultation with the college academic advisor. It is the responsibility of the academic advisor to monitor the student's progress.

Students on suspension are not allowed to register on any campus of the University of Colorado while on suspension, except continuing education or regular campus summer sessions. Suspended students are readmitted on a case-by-case basis by review of the college.

Students suspended a second time are reinstated only under special circumstances. Students who believe that their situations warrant a departure from these normal stipulations may petition for reinstatement. The college looks with favor on such petitions only if the student has shown marked improvement in academic work or if there are unusual circumstances that have contributed to the student's academic difficulties.

## Attendance

Students are expected to attend classes regularly and to comply with the attendance regulations specified by their instructors. At the beginning of each semester, instructors inform students of policies governing grading policies and attendance in each class. Students who miss a final examination for illness or other good reason must notify the instructor or the college office no later than the end of the day on which the examination is given.

## Admission and Enrollment Policies

The College of Architecture and Planning currently offers emphases leading to specialized majors in architecture, design studies, planning/urban design, and environmental design within its environmental design degree program. All new students initially enter the college as environmental design majors. Completion of the 30 credit lower-division core leads to entry into one of three specialized upper division emphases—architecture, planning/urban design, and design studies. Students indicate their choice of upper-division emphasis by the particular design studio and design history class they elect to complete in their second year in the program. Policy questions may be directed to **303-492-7711** or **askAP@colorado.edu**.

## Requirements for Admission

Candidates for regular admission to the College of Architecture and Planning are expected to meet the general requirements for admission to the university. See Undergraduate Admission in the General Information section of this catalog for specific requirements.

## Transfer Students

Qualified students transferring from other institutions are accepted into the College of Architecture and Planning. Former students who have attended another college or university for one semester (12 hours or more) are considered to be transfer students. Since the College of Architecture and Planning has a limited enrollment, all qualified students are not guaranteed admission. All course work except the last term, if in progress, must be completed and must be listed on the official transcript sent for admission consideration. Transfer students should apply to the Office of Admissions.

Students are encouraged to transfer as early as possible in their undergraduate career due to the large amount of design- and planning-related course work required by the different ENVD curricula. All transfer students, like freshmen, enter the college as environmental design (ENVD) students, and apply for admission to one of the five emphasis majors—architecture, environmental design, landscape design, planning, or design studies—in the final semester of their junior year. All transfer students are required to take a minimum of 30 semester hours in the College of Architecture and Planning. Transfer students are admitted for the fall, spring, and summer terms each year.

If a student chooses to provide letters of intent and recommendation, they must accompany the application. It is the responsibility of the student to be sure transcripts and other application materials are complete. Only complete application files are considered for admission.

A maximum of 60 semester hours taken at a two-year college may be applied toward the baccalaureate degree. In general, credits in vocational-technical courses are not accepted for transfer by the college. Transfer agreements between the University of Colorado and all Colorado community colleges outline approximately one year of prescribed general education courses that may be completed as preparation for transfer into the College of Architecture and Planning. As noted above, students should plan to transfer to the University of Colorado by the beginning of their sophomore year. See Undergraduate Admission under General Information in this catalog for admission standards for transfer students.

## Intrauniversity Transfer (IUT)

University of Colorado students in good standing who are interested in pursuing a design education may apply for transfer into the college. IUT applications are distributed at meetings held for interested students several times each semester. Students should contact the college offices for the dates of meetings and deadlines for application review for specific semesters. Completion of specified introductory courses may be required before an IUT application for transfer into the college can be considered. Because of the limited number of spaces available in the program, admission is competitive and grade point average plays a significant role in the application process. It may also serve as a basis for entry to introductory courses required for IUT application. All IUT students are admitted as ENVD open option students, and must select an upper-division emphasis following the processes described in the introduction to the Curriculum section that follows.

## Credit Policies

### Advanced Placement

Advanced Placement and college credit may be granted on the basis of the College Board's Advanced Placement tests. For students who have taken Advanced Placement course work in high

school and receive scores meeting university standards in the Advanced Placement examination, Advanced Placement as well as college credit is granted. Granted college credit is treated as transfer credit without a grade, but counts toward graduation and meets other specific requirements for which it is appropriate.

### ***Incomplete Grades***

The college's faculty set their own policies for grading and for granting incompletes. Special conditions may be noted on class syllabi. In all cases, students must present evidence of circumstances beyond their control that prevent them from completing the class. The student and faculty member must complete a written agreement (form available in college offices) outlining the terms of course completion and submit this agreement to the dean's office.

### ***Independent Study***

Ordinarily, only students at the 3000- or 4000-level of studio are permitted to obtain independent study credit. Independent study credit may not be used to substitute for any required core or design studio course.

A complete description of the scope of the independent work, a summary of how it will be carried out, and a definition of the intended outcomes must be submitted to the supervising faculty member no later than five days after the official beginning of a semester. Approval of the description must be by the faculty member and the department chair before permission is granted for enrollment in the independent study course. Students should make arrangements for the independent study course details during registration or well before the semester begins.

Typically, only students who have at least a 3.000 GPA are permitted to register for independent study. Additional requirements might be established depending on the proposed topic. Not more than 3 hours of independent study credit during one semester and not more than a total of 6 are given for the entire time the student is enrolled, unless an exception is granted by the dean.

### ***Other Credits***

Credits for teaching assistantships, research assistantships, and internships are all guided by the same standards as those for independent study. Credits earned as a teaching assistant, research assistant, or intern are not subject to the 6 credit-hour limitation on independent study credit. Teaching assistantships and internships are offered on a *pass/fail* basis only.

### ***Pass/Fail Credits***

A student may elect to take up to 6 semester hours toward the BEnvd degree on a *pass/fail* basis, but these credits must fall in the category of general electives and may not include course work taught within the College of Architecture and Planning.

Students should confer with the college's academic advisor regarding specific academic standards for repeating laboratory, studio, and other undergraduate courses. Credits for repeated courses are not counted toward the 120 semester hours needed for graduation.

### ***ROTC Credit***

Students matriculating in the College of Architecture and Planning are eligible to participate in the ROTC programs on the Boulder campus.

Students interested in such programs should contact the professor in charge of the ROTC program of their choice (Army,

Navy, Air Force) and also the academic advisor for the college for information on residence and curriculum requirements for graduation. Credit for ROTC courses may be given upon faculty recommendation to a maximum of 8 hours.

### ***Transfer Credit***

Credits transferred from other institutions are limited to the number of credit hours given for similar work in regular offerings at the University of Colorado. Exceptions to this regulation may be made by the dean upon written petition.

In general, the college does not accept vocational/technical course work in design, graphics, or construction as meeting specific course requirements of the program; nor does it consider such course work as acceptable in fulfilling the college's elective requirements. Only in exceptional circumstances may a student petition the dean of the college to request a transfer of such credits. A student may, however, ask that vocational/technical course work be considered as a basis for waiving a specific course in a required sequence.

A grade of C- or better is required in any course for which credit is granted in transfer from another institution to the university. Grades earned in other institutions (excluding other campuses of the University of Colorado) are not computed with the student's CU grade point average.

For more information on transfer credit policies, see Transfer of College-Level Credit in the Admissions section.

### ***Residence Requirement***

A student must complete a minimum of 30 course credits within the College of Architecture and Planning. Students also must complete their last semester in residence as full-time students.

### ***Advising***

Academic advising for students presently enrolled or anticipating enrollment in the college's undergraduate program is provided in a variety of forms. High school students or prospective transfer students from other universities are encouraged to participate in "Be a CU Student for a Day" or other visitation programs co-sponsored by the college and the CU-Boulder Office of Admissions. Information on campus visitation programs may be obtained by contacting the Office of Admissions at **303-492-6301**, or [www.colorado.edu/prospective/freshman/visit](http://www.colorado.edu/prospective/freshman/visit).

Students already enrolled in Boulder campus programs who are interested in intrauniversity transfer (IUT) into the College of Architecture and Planning should contact the college office at **303-492-7711** for group meeting times focusing on the IUT transfer process.

Students enrolled in the college's undergraduate programs receive academic advising from faculty or professional staff in the college. Information on appointments and open office hours for advising is available at the college office, ENVD 168, or by calling **303-492-7711**.

### ***Orientation***

In order to receive an overview of educational opportunities and the philosophy of the college, and to meet other new students and the faculty of the college, incoming freshman and transfer students are required to attend an orientation approximately one week prior to the beginning of the fall semester.

### ***Retention of Student Work***

The College of Architecture and Planning may, with the student's written consent, retain student work submitted in fulfill-

ment of class requirements for a period of time. This retained work is normally used to provide accrediting agencies with tangible evidence of performance, to serve as additional visual aid material in presentations to other students, and to contribute to possible educational exhibits and publications requested by the university community and the general public.

### Computing in the College

The College of Architecture and Planning now requires that all incoming undergraduate students have and use their own computers and software applications in their studies. ITS on the Boulder campus has suggested hardware and software configurations for both desktop and notebook computers on their website at [www.colorado.edu/its/recommendations/index.html](http://www.colorado.edu/its/recommendations/index.html). Neither the Boulder campus nor the College of Architecture and Planning endorses or requires students to buy a computer from a particular manufacturer. The configurations suggested by ITS establish basic performance requirements that can be found in many different computers. Specialized software requirements for different classes in the ENVD program appear on the syllabi for those classes, and that software is generally available through the bookstore at discounted student rates.

### The Core

All students entering the college, whether as freshmen, external transfer, or intrauniversity transfer students, initially enter the college's core as environmental design students and are enrolled in the bachelor of environmental design degree program. All students admitted into the college's undergraduate degree program graduate with the bachelor of environmental design degree with an emphasis major. The emphasis majors are those in architecture, in environmental design, landscape design, planning, and design studies.

In the core, entering ENVD students take a coordinated sequence of interdisciplinary courses that emphasize the knowledge, methods, and practices common to the fields of architecture, planning, urban design, landscape design, and design studies. As the established design professions are increasingly collaborating on complex design issues related to the designed environment, the mix of core courses responds to and reflects these interdisciplinary and integrative trends. The interdisciplinary core sequence is delivered in the first five semesters of the program.

### Moving into the Emphasis Majors

Completion of the lower-division core leads to entry into one of five specialized upper-division emphasis majors: architecture, environmental design, landscape design, planning/urban design, or design studies. All students in the lower division initially indicate their choice of disciplinary emphasis by the particular classes they elect to complete in the sixth semester of the program.

There are 30 required and elective credits in each emphasis major. Each emphasis has been carefully designed to prepare students for graduate studies, for entry into the workplace, or for both. The emphases in architecture, landscape design, and planning/urban design are specifically designed to lead to accelerated programs of study in the college's graduate professional programs on the Denver Campus. This is also true in the case of the environmental design and design studies majors and their options. Students who elect the architecture emphasis must complete 36 credits of elective courses in the arts, humanities, or sciences, in order to ensure a normal transition into a graduate program in architecture. Completing an environmental design

or design studies major can also, depending on the particular requirements of graduate professional programs at other institutions, lead to advanced standing in those programs that can shorten the number of credits required to complete those programs. Students continuing in the upper-division ENVD emphases are subject to the academic standards defined in this catalog.

### Moving into the Core

Students entering the college as freshmen are admitted through the University of Colorado at Boulder's admission process for entering students and are admitted directly into the ENVD degree program.

Transfer students from other universities who enter CU-Boulder with freshman standing (29.9 credit hours or fewer completed) and who want to pursue a particular emphasis or major are initially admitted into the ENVD degree program and need to complete the core before choosing their emphasis and major.

Intrauniversity transfer students (IUTs) from other schools and colleges on the Boulder campus who are in their freshman year can IUT into the ENVD degree program provided that they meet the IUT requirements for entry to the college. One of these requirements is completion of the ENVD 1004 class before applying for entry into the ENVD program. IUTs with sophomore standing or above have a maximum of 30 credit hours after admission to the ENVD degree program to complete the core before choosing an emphasis major.

Transfer students from other universities offering pre-professional or accredited professional degree programs in one of the college's areas of emphasis who enter CU-Boulder with sophomore standing or above (30 hours or more of transfer credit) may be admitted to the ENVD degree program with advanced standing. They have a maximum of 30 credit hours after transferring into the college to complete the core before choosing their emphasis major. The college may in certain cases and in consultation with its departments approve direct admission to an emphasis for transfer students from these other institutions if those students have junior or senior standing in those programs.

## The BEnvd Curriculum

### General Degree Requirements

Students must complete a minimum of 120 semester hours, subject to the maximum outlined in this catalog, and maintain a GPA of 2.000 or better. Students must complete one course from each subject area.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Writing</b>	
WR TG 1150 or AR SC 1150 . . . . .	3
Students also must demonstrate advanced-level writing skills. If they cannot, they may be required to complete additional course work.	
<b>Math Requirement</b>	
One course from the following: BCOR 2010; ECON 3818; GEOG 3023; MATH 1130, <b>1150</b> , <b>1300</b> , 2380, <b>2510</b> ; PSYC 2101; SOCY 2061 (Note: courses in <b>bold</b> are suggested as particularly appropriate for disciplinary majors in ENVD.) . . . . .	3
<b>Science Requirement</b>	
One course from the following: CLAS 2020; CHEM 1111; ENVS 3070; EBIO 1030 and 1050, 1210 and 1230; PHYS 1230, 1240, 1300, 1700, 1010, 1020, 2010 . . . . .	3
<b>Social Science</b>	
One course from the following: ANTH 1030, 1040, 2100, 2200; BLST 2437; CHST 2537; ECON 1000, 2010, 2020; GEOG 1982, 1992; HIST 1010, 1015, 1020, 1025, 1035, 1038, 1040, 1045, 1051, 1061, 2103, 2117, 2123, 2180, 2437,	

2537, 2717; IAFS 1000; PSCI 1101, 2012, 2101; PSYC 1001; SOCY 1001, 1002, 1031, 2011, 2041; WMST 2000 . . . . . 3

### Humanities

One course from the following: ARTH 1300, 1400, 2409; CHST 1031; ENGL 1200, 1260, 1300, 1400, 1500, 1600, 2602, 2612; HUMN 1010, 1020; PHIL 1000, 1100, 1200, 1400, 1440, 1600, 1700, 1750; WMST 1260 . . . . . 3

## ENVD Curriculum and Course Sequence

*Required Courses* *Semester Hours*

### First-Year Core Classes

#### Fall Semester

ENVD 1004 Introduction to Environmental Design Theory . . . . . 3  
 ENVD 1052 Design and Communication: Digital . . . . . 3  
 ENVD 2001 Social Factors and Design . . . . . 3  
 Writing requirement . . . . . 3  
 Humanities (see list of options above) . . . . . 3

#### Spring Semester

ENVD 1104 Introduction to Environmental Design Methods . . . . . 3  
 ENVD 1102 Design and Communication: Analog . . . . . 3  
 ENVD 2003 Ecology and Design . . . . . 3  
 Social science (see list of options above) . . . . . 3  
 Science requirement (see list of options above) (Note 1) . . . . . 3

### Second-Year Core Classes

#### Fall Semester

ENVD 2120 Environmental Design Lab – Sustainable Design . . . . . 6  
 ENVD 3124 Issues in Planning History . . . . . 3  
 ENVD 3122 Research Issues and Methods in Planning and Design . . . . . 3  
 Math requirement (see list of options above) (Note 2) . . . . . 3

#### Spring Semester

ENVD 2130 Environmental Design Lab: Conservation Design . . . . . 6  
 ENVD 3015 Historic Preservation . . . . . 3  
 ENVD 3114 History and Theories of Architecture 1 . . . . . 3  
 Non-ENVD elective (Note 3) . . . . . 3

### Third-Year Core Classes

#### Fall Semester

ENVD 3300 Intermediate Design Lab: Restorative Design . . . . . 6  
 ENVD 3001 Environment and Behavior . . . . . 3  
 ENVD 3131 Citizen Participation in Design and Planning . . . . . 3  
 Non-ENVD elective . . . . . 3

#### Spring Semester

Elective ENVD Design Lab . . . . . 6  
 ENVD elective . . . . . 3  
 Non-ENVD elective . . . . . 6  
 Required and elective credits for core . . . . . 90

### Fourth Year—Pre-professional Studies

#### Fall Semester

ARCH, PLNG, LARC, ENVD 45XX Studio . . . . . 6  
 ARCH, PLNG, LARC, ENVD elective . . . . . 3  
 ARCH, PLNG, LARC, ENVD elective . . . . . 3  
 Non-ENVD elective . . . . . 3

#### Spring Semester

ARCH, PLNG, LARC, ENVD 47XX Studio . . . . . 6  
 ARCH, PLNG, LARC, ENVD elective . . . . . 3  
 ARCH, PLNG, LARC, ENVD elective . . . . . 3  
 Non-ENVD elective . . . . . 3  
 Required and elective credits for emphasis major . . . . . 30

**Total Credits, BENVD Degree Program . . . . . 120**

#### Course Note

- 1 Students intending to enroll in the architecture emphasis are strongly encouraged to take a physics class.
- 2 Students intending to enroll in the architecture emphasis are strongly encouraged to take a pre-calculus math class.
- 3 Students intending to enroll in the architecture emphasis are strongly encouraged to take a total of 45 credits of general study.

## The Design Studies Emphasis

The design studies emphasis is intended for those students who do not wish to pursue a professional career in architecture or planning, but who are interested in issues concerning the built environment. Students in this emphasis are expected to attain a moderate level of understanding and skill in either architecture, landscape design, or planning. In addition, they are expected to attain a high level of understanding and skill in one specialized aspect of these fields, and a moderate level of understanding in a cognate discipline outside the college.

A minimum of 30 semester credit hours must be completed after official approval of entry into the design studies emphasis. Admission to the undergraduate upper-division design studies emphasis is competitive and is based on a review by the faculty by no later than the final semester of the sophomore year.

*Required Courses* *Semester Hours*

Design studio/design workshop requirement . . . . . 9-12  
 History/theory requirement . . . . . 6-9  
 Design studies electives . . . . . 18  
 Free electives . . . . . 24

Electives—both required and free—must be approved by both the student's faculty sponsor and the college dean's office. At least 12 elective credits must be taken within the College of Architecture and Planning, of which at least three courses must be chosen from separate categories (i.e., design, methods, history, social factors, physical factors, and technology). At least 15 credits must be taken from outside the College of Architecture and Planning. Elective hours beyond these specified 27 may be taken either within or outside the college.

**Required upper-division emphasis credits . . . . . 60**

## Dual-Degree Programs

In addition to the BEnvd degree, students may pursue a degree in another college at CU-Boulder. Past students have received the BEnvd degree concurrently with undergraduate degrees in business, engineering, and various programs offered by the College of Arts and Sciences. Typically, specific course requirements do not change in either program of a double degree; however, additional hours (varying by college) may be required. All undergraduate students must complete the general education requirements and the requirements for their specific emphasis area within the College of Architecture and Planning in addition to the other college's requirements. Students considering a double-degree program are encouraged to speak with advisors in both colleges to determine requirements and procedures for application.

## Faculty—College of Architecture and Planning

MARK GELERTNER, dean of the College of Architecture and Planning; professor of architecture. BArch, Montana State University; PhD, Bartlett School of Architecture and Planning, University College, London.

AUSTIN ALLEN, associate professor of landscape architecture. AB, University of California, Berkeley; MA, PhD, Ohio University.

BARBARA AMBACH, associate professor of architecture, clinical teaching track. BArch, BFA, Rhode Island School of Design; MArch, Southern California Institute of Architecture.

AMIR AMERI, associate professor of architecture. BArch, University of California, Berkeley; MArch, PhD, Cornell University.

KEN ANDREWS, instructor in architecture, BEnvd, University of Colorado; MArch, Rice University.

ERNESTO G. ARIAS, professor of planning and design emeritus.

OSMAN ATTMANN, associate professor of architecture, BArch, Mirmar Sinan University; MArch, State University of New York at Buffalo; PhD, Georgia Institute of Technology.

MEREDITH BANASIAK, instructor of architecture. HAB, Xavier University; MArch, Arizona State University.

JOHN BARBOUR, instructor in planning and design, BEnvd, MURP, ABD, University of New South Wales.

LOIS A. BRINK, professor of landscape architecture. BA, MLA, University of Pennsylvania.

CHARLES CHASE, instructor in landscape architecture. BSC, Colorado State University; MSC, University of Colorado; ABD, Florida State University.

LOUISE CHAWLA, professor of planning and design. BA, Hunter College; MA, Bryn Mawr College; PhD, City University of New York.

THOMAS A. CLARK, chair, department of planning and design; professor of planning and design. AB, Brown University; MA, PhD, University of Iowa.

LORI COCKERHAM, senior instructor in landscape architecture. BLA, Iowa State University; MLA, University of Pennsylvania.

JOE COLISTRA, senior instructor in architecture. BED, Miami Ohio; MArch, University of Colorado.

MARCEL DELANGE, instructor in architecture. MArch, Delft Institute of Technology.

ROBERT H. FLANAGAN, associate professor of architecture. BS, Southeastern Massachusetts University; MArch, University of Colorado. Registered architect: Colorado.

ALLEN HARLOW, senior instructor in architecture. BArch, MArch, University of Colorado. Registered architect: Colorado.

JULEE HERDT, professor of architecture. BS, Western Kentucky University; BArch, University of Tennessee; MArch, Southern California Institute of Architecture. Registered architect: Tennessee, Colorado.

GEORGE HOOVER, professor of architecture. BArch, Cornell University. Registered architect: Colorado, California, and Texas.

MATTHEW JELACIC, assistant professor of architecture. BArch, Pratt Institute; MArch, Harvard.

MICHAEL JENSON, associate professor of architecture. BS, University of Texas; MArch, Columbia University; PhD, University of Edinburgh.

ANN KOMARA, chair, department of landscape architecture; assistant professor of landscape architecture. BA, Pennsylvania State University; MA, MLA, University of Virginia.

CHRISTOPHER KOZIOL, associate professor of architecture. BA, University of Chicago; MArch, MURP, University of Illinois; PhD, University of Colorado Denver. Registered Architect: Colorado.

KEVIN KRIZECK, associate professor of planning and design. BSE, Northwestern University; MRP, UNC Chapel Hill; MSCE, PhD, University of Washington.

JOERN LANGHORST, assistant professor of landscape architecture. BLA, MLA, ABD, University of Hannover.

JOHN LANTERMAN, instructor in landscape architecture. BSC, Colorado State University; MLA, University of Colorado.

YUK LEE, associate dean, academic affairs, Denver; professor of planning and design. Diploma, Chung Chi College, Chinese University of Hong Kong; BA, Eastern Kentucky University; MA, University of Cincinnati; PhD, Ohio State University.

LAURENCE K. LOFTIN, III, associate professor of architecture. BA, Princeton University; MArch, University of Virginia. Registered architect: Colorado.

TAMARAH LONG, instructor in architecture. BED, University of Pennsylvania; MArch, University of Florida.

TAISTO MAKELA, chair, department of architecture; associate professor of architecture. BArch, University of Oregon; MA, PhD, Princeton University.

CHUCK McBRIDE, senior instructor in architecture. BArch, Penn State University; MArch, Columbia.

RAYMOND McCALL JR., associate professor of planning and design. BS, University of Wisconsin–Milwaukee; MS, Illinois Institute of Technology; PhD, University of California, Berkeley.

HANS R. MORGENTHALER, associate dean of academic affairs; associate professor of architecture. BA, University of Zurich; MA, PhD, Stanford University.

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BRIAN MULLER, associate professor of planning and design. BA, Yale University; MPA, University of Texas.

JEREMY NEMETH, assistant professor of planning and design. BA, University of California, Berkeley; MS, Bartlett School of Architecture; PhD, Rutgers University.

PATRICIA O'LEARY, professor of architecture. BArch, MArch, Arizona State University. Registered architect: Arizona and Arkansas.

PETER PARK, associate professor of planning and design. BSAS, Arizona State University; MArch, MUP, University of Wisconsin.

JOHN M. PROSSER, professor of architecture emeritus.

GEORGE POND, senior instructor in landscape architecture. BA, Kenyon College; MArch, MLA, University of Colorado.

JASON REBILLLOT, senior instructor in architecture. BSAS, University of Wisconsin–Milwaukee; MArch, University of Illinois at Chicago.

RANCO RUZIK, senior instructor in architecture. BArchEng, University of Croatia; MArch, University of Colorado.

FAHRIYE HAZER SANCAR, professor of planning and design. BArch, Middle East Technical University, Turkey; MS, PhD, Pennsylvania State University.

MELANIE SHELLNBARGER, senior instructor in architecture. BA, St. Mary's College; BID, Interior Design Institute, Denver; ABD, University of Colorado.

PETER SCHNEIDER, professor of architecture. BArch, University of Cape Town.

ERIK SOMMERFELD, associate chair, department of architecture; senior instructor in architecture. BEnvd, MArch, University of Colorado.

WILLEM K. T. VAN VLIET, director of undergraduate studies; professor of planning and design. Doctorandus, Free University of Amsterdam; PhD, University of Toronto.

EKATERINI VLAHOS, associate professor of architecture. BEnvd, MArch, University of Colorado. Registered architect: Maryland and Colorado.

PAMELA WRIDT, associate chair, department of planning and design; senior instructor in planning and design. BS, University of Wisconsin–Whitewater; MS, Southwest Texas State University; MA, City University of New York–Hunter College; PhD, City University of New York–Graduate Center.

PING XU, professor of architecture. BA, MArch, Tsinghua University (PRC); MLA, University of Pennsylvania; DDesign, Harvard University.



# College of Arts and Sciences

*Todd Gleeson, dean*

275 UCB • phone: 303-492-7294 • fax: 303-492-4944  
college website: [www.colorado.edu/artsscience](http://www.colorado.edu/artsscience)



**T**HE COLLEGE OF ARTS AND SCIENCES is the liberal arts college at CU-Boulder. Its mission is to provide an outstanding liberal arts education for its undergraduates, cutting-edge graduate education, and world-class research, scholarship, and creative work. In addition to gaining the knowledge and skills of their areas of study, students learn how new information is acquired, and they can participate in original research and creative work with individual faculty members.

The college offers a wide variety of fields of study, with nearly 50 undergraduate majors. The environment and advantages of a small liberal arts college are created through “academic neighborhoods” in which students can meet and interact with other students and faculty in small group settings. In addition, more than 60 percent of undergraduate classes are small, with 25 or fewer students.

As the liberal arts college of CU-Boulder, the College of Arts and Sciences has several goals in the education of its students:

- Educate students for careers and a productive life. Arts and sciences students gain the most current knowledge and skills in their major fields of study. In addition, they learn how to acquire new skills to contend with—and lead—the changes that will occur in the decades to come. Education for a productive life also requires that students learn how to analyze situations, solve problems, and speak and write effectively.
- Provide students with a well-rounded education. Arts and sciences students acquire a broad knowledge and an integrated understanding of art and music, great literary works, philosophy, history and politics, the social world, science, and technology. They learn how to critically evaluate and think about morals, ethics, and values. The core curriculum and breadth requirements give students a broad, liberal-arts education that develops the whole person, not just the specialist.
- Educate citizens who can think for themselves, understand the rapidly changing world, and make wise choices within a democratic system.
- Impart a love of learning so that students can continue to grow throughout life.
- Teach ways of thinking about and approaching new problems. For some students, this will enable them to further advance knowledge and scholarship in the academy. For all students, this is important for enriching their lives.
- Prepare students to help enrich the lives of others. Arts and sciences graduates become lifelong resources for their families, neighbors, friends, and co-workers.

The college also is dedicated to outstanding graduate education. Advanced degrees are offered by nearly every academic department in the college, and the PhD is offered in approximately 30 different disciplines. In addition, an increasing number

of departments offer combined bachelor’s/master’s degrees that can be earned in five years. Graduate training focuses on teaching and research careers as well as on professional careers in the public and private sector.

The strength of the College of Arts and Sciences comes from its outstanding faculty. In addition to being dedicated teachers, they are active scholars in disciplines throughout the arts and humanities, social and behavioral sciences, biological sciences, and physical and mathematical sciences. They are the recipients of numerous national awards and honors for their research, scholarship, and creative work. Faculty and staff of the College of Arts and Sciences join together to create an intellectual community of students and scholars to discover, critically examine, integrate, preserve, and transmit knowledge, wisdom, and values.

## Programs of Special Interest

### Honors Program

The Honors Program is designed to provide special educational opportunities for highly motivated students. It is open to well-prepared freshmen, as well as to sophomores and upper-division students in all schools and colleges. The Honors Program offers thoughtful advising, close contact with faculty and with other honors students, and an opportunity to write an honors thesis. Honors offers over 70 courses per year in a wide variety of areas. In any academic year about one-fourth of all Honors courses are offered under the HONR designation; the remainder are offered as seminars under departmental designations (CHEM, ENGL, HIST, IPHY, and so on). Course offerings for each semester are listed, with detailed descriptions, on the Honors Program web page at [www.colorado.edu/honors/courses](http://www.colorado.edu/honors/courses). Honor courses are limited to an enrollment of approximately 15 students.

Faculty members teaching honors seminars are carefully selected for special interests and enthusiasm, for teaching excellence in small discussion classes, and for insistence on high academic standards. Honors seminars are designed for the student who welcomes challenge, knows that the mind expands only with effort, and actively seeks academic and intellectual challenges. Honors courses encourage students to think creatively. Many honors courses are interdisciplinary; all encourage students to read widely and critically.

The Honors Council, consisting of faculty from all participating academic departments, is responsible for deciding which students merit the award of the bachelor’s degree with honors: cum laude, magna cum laude, and summa cum laude. These awards are made on the basis of special honors work and not simply on the basis of grades earned in courses.

Students may graduate with departmental honors or general honors, or both. Departmental honors may require a junior or

senior honors seminar, an independent research project, and/or directed readings. All departments require an honors thesis. Each department has information pertaining to its own particular program. General honors, supervised and administered directly by the Honors Program and its core faculty, permits students to pursue interests and ultimately to write theses that cross disciplinary and departmental boundaries. To graduate with general honors, students must have a cumulative GPA of 3.50 or higher, have completed 12 credit hours of required honors courses, and have written a thesis on an interdisciplinary topic.

The Honors Residential Academic Program (HRAP) is the optional residential component of the program. HRAP, open to a limited number of qualified freshmen and sophomores, consists of small classes offered in the Arnett residence hall as well as opportunities to participate in extracurricular activities. There is an additional charge for the Honors Residential Academic Program. See below for more information.

Detailed information concerning the Honors Program may be obtained in the honors office in Norlin Library. Qualified students may register for courses. Course offerings and call numbers can be found on the Honors Program website.

Freshmen are invited to join the Honors Program based on their high school GPA and test scores. Transfer students must have a 3.300 GPA from their previous school. Students currently enrolled are accepted on the basis of academic achievement at CU-Boulder. While honors students are expected to have a GPA of at least 3.300, it should be emphasized that no student who shows ability and promise is excluded from consideration. This is a program of excellence and commitment in which the best teaching faculty is committed to serve the most highly motivated students for the benefit of those students and the larger society.

### Miramontes Arts and Sciences Program

The Miramontes Arts and Sciences Program (formerly the Minority Arts and Sciences Program) supports a community of diverse scholars dedicated to academic excellence and provides assistance in their successful matriculation in and graduation from the College of Arts and Sciences at CU-Boulder. For students interested in science and mathematics, MASP emphasizes study leading to the BA degree in selected fields, including biology, chemistry/biochemistry, integrative physiology, mathematics, physics, and applied mathematics. In the fall of 1999 MASP expanded to support underrepresented students interested in pursuing humanities and social sciences degrees, including history, theatre, fine arts, and other disciplines within the College of Arts and Sciences.

MASP facilitates the often-difficult transition from achieving excellence in high school to achieving excellence in the college learning environment. It provides a personally supportive community and intense academic instruction, and helps develop a strong sense of group cohesiveness and spirit.

MASP provides scholarships to its promising students. Grade point average (GPA), financial need, and other academic indicators assist in determining scholarship eligibility and amounts. MASP also provides mentoring, academic advising and clustering, academic co-seminars and seminars, the Summer Program for Excellence in Academics and Community (PEAC) for incoming CU freshmen, self-management and leadership workshops, and a MASP networking and study center.

For more information, call the MASP office at **303-492-8229**.

### Norlin Scholars Program

The Norlin Scholars Program is a special academic and scholarship program designed for students with a strong love of

learning. It is open to students in all majors and all colleges and schools. Special courses have been created exclusively for Norlin Scholars; they are broadly synthetic to be appropriate for any student in any major. Special mentoring and opportunities for original research receive emphasis. The program is highly competitive and carries a \$3,000/year scholarship. Students may enter as first-year students or as rising juniors. More information and application forms are available at [www.colorado.edu/norlin-scholars](http://www.colorado.edu/norlin-scholars), or Norlin Scholars Program, University of Colorado at Boulder, 365 UCB, Boulder, CO 80309-0365, or at **303-735-6802**.

## Residential Academic Programs

### Baker Residential Academic Program

The Baker Hall Residential Academic Program (RAP) is designed primarily for freshman and sophomore students who are interested in the natural sciences and environmental studies. The program provides courses that satisfy various core curriculum requirements in the College of Arts and Sciences and in majors such as ecology and evolutionary biology, integrative physiology, geography, geology, chemistry, and the interdisciplinary major in environmental studies. Courses are typically limited to 25 students and are taught in classrooms located in Baker Hall. Baker RAP offers access to academic advising, career counseling, student internships, guest speakers, field trips, and close faculty contact. The combination of small classes, a group of students who take many of the same classes together, and frequent field trips and special lectures creates a small-college atmosphere while offering the advantages of studying at a major research university.

Baker RAP offers courses in biology, geology, physics, chemistry, geography, mathematics, economics, history, political science, philosophy, anthropology, and expository writing. The curriculum is designed to maximize the opportunities for students to satisfy core curriculum requirements in the College of Arts and Sciences. Upper-division courses are presented in geography and environmental studies. Upper-division credit also is available through independent study and research. Students usually take one or two of the above courses each semester. Baker RAP also reserves seats for its students in certain high-demand courses taught outside the program, including introductory biology and chemistry laboratories.

The Baker RAP curriculum is augmented through experiential learning outside of the classroom. Undergraduate research plays an important role in these experiences. Interested students are encouraged to participate in research projects as early as their first year. Baker RAP instructors work closely with the Undergraduate Research Opportunities Program (UROP) to facilitate matching Baker RAP students with faculty members with similar research interests.

Baker RAP cocurricular activities offer social and educational opportunities for students in the program. These activities include a kick-off barbeque at the beginning of the school year, local hikes, a day of cross-country skiing, and a spring-time service-oriented activity emphasizing environmental conservation. Guest lecturers are invited to speak about scientific or environmental themes.

There is a fee for participation in Baker RAP in addition to regular tuition, fees, and room and board. Students eligible for financial aid may request that their budget be adjusted to include the program fee. Their eligibility for aid will then be increased by an amount equal to the Baker RAP fee. Students interested in the program should write to the Baker Hall Residential Aca-

dem Program, University of Colorado at Boulder, 176 UCB, Boulder, CO 80309-0176, or call **303-492-3188**.

### Buckingham Residential Academic Program

Buckingham Hall's Communication Residential Academic Program (COMMRAP) offers a living-learning environment for 225 students designed around the theme of Communication and Society. It offers students an opportunity to engage with faculty and other students in a small college atmosphere within a major research university. Students explore the complex social problems and challenges of communication in contemporary society in seminar-sized courses. They also have opportunities to participate in co-curricular activities that stress civic engagement. The many opportunities for outreach and collaboration with the Boulder community provide an excellent venue for learning by doing.

A unique feature of the program is its integration of courses from its three supporting units, the Department of Communication, School of Journalism and Mass Communication, and the Program for Writing and Rhetoric. These courses emphasize the role of participation, deliberation, and collaboration in shaping and resolving public problems and problems in daily life. Its offerings also include opportunities for upper-division courses on topics germane to communication and society.

In addition to communication offerings, the curriculum includes courses that satisfy the writing and core requirements in Arts and Sciences. Across the year, guest lectures and seminars provide opportunities to interact on civic engagement and societal participation with leading experts on the CU faculty and distinguished visitors to the university.

The Buckingham COMMRAP is open to students with an interest in communication and society, regardless of major. A fee is charged for participation in the program. For more information, contact Gerard Hauser at **303-492-6756**.

### Farrand Residential Academic Program

Farrand's small seminar courses in the liberal arts are taught by award-winning faculty especially selected to help create a close intellectual and social community. As the Humanities and Cultural Studies Residential Academic Program, Farrand focuses on the study of the humanities within the larger frame of culture and society. Farrand also offers high-demand courses from all areas of the curriculum. These include service-learning classes, which provide a deeper cultural understanding by applying classroom learning to service to the community.

Each semester, every Farrand student takes a Farrand course that provides a shared academic experience. For many students, this course will be a humanities course, such as Greek Mythology, Introduction to Ethics, or the interdisciplinary Introduction to the Humanities, reflecting a commitment to the humanities that is central to Farrand's identity. Because helping others contributes to the learning experience as well as to the whole community, Farrand offers several service-learning classes each semester. Service learning gives students the chance to apply what they study in their classes to real-life situations, such as a homeless shelter, a humane society, or a tutoring program. These classes include Gandhian Philosophy; Nutrition, Health, and Performance; and Global Women Writers. The Farrand curriculum also offers a wide range of popular core curriculum classes taught by faculty known for their teaching skills. Deviance, Calculus, and Introduction to Environmental Studies are just a few examples.

Farrand's many cocurricular opportunities include a wide variety of events and performances, active and well-supported student governance (Farrand Community Council), and group projects benefiting the community and the environment.

The program is designed primarily for students in the College of Arts and Sciences. Interested students in other colleges should contact the Farrand program for special admission procedures. It is administered by academic directors selected from the faculty and a hall director experienced in the operation of a large residence hall. There is a charge for the program in addition to regular tuition, fees, and room and board.

Inquiries concerning any aspect of the academic program may be directed to the Farrand Academic Program, University of Colorado at Boulder, 180 UCB, Boulder, CO 80309-0180, **303-492-8848**.

### Global Studies Residential Academic Program

The Global Studies Residential Academic Program (G-RAP) promotes the recognition of global interdependence, introduces 200 first-year students to the many cultures of the world, encourages the study of foreign languages and international affairs, and emphasizes the value of international education. Like all the other Residential Academic Programs, G-RAP provides its students with a small community of similarly interested students, which eases the transition to the university. A diverse group of students who have similar interests and goals participate in programs designed to promote understanding of the global community. All G-RAP students are required to take at least one designated course in the fall and spring semesters with an international focus. Dinner programs introduce students to faculty who work internationally and bring that experience back to their teaching on campus. Additionally, participating students attend many internationally focused events on and off campus, such as the Conference on World Affairs. Throughout the year, students receive guidance on academic and career options and study abroad opportunities. The Global Studies Residential Academic Program is open to all entering first-year students who submit an application. Participants live together in the east wing of the Cheyenne Arapaho residence hall, where they enjoy a number of special facilities, programs, and amenities. In addition to benefiting students interested in studying abroad or those whose majors have an international component, G-RAP enhances many of the majors offered at CU-Boulder. A fee is charged for participation in G-RAP. For more information, contact Tom Zeiler or Jessica Wilson at **303-786-3189**.

### Honors Residential Academic Program

The Honors Residential Academic Program (or HRAP; formerly known as the Kittredge Honors Program, or KHP) is the residential component of the Honors Program of the College of Arts and Sciences. It is open to approximately 200 honors-qualified first- and second-year students. Participants live in Arnett Hall.

The Honors Residential Academic Program promotes and sustains academic excellence within a lively community setting. Each semester the program offers a variety of honors courses in Arnett's state-of-the-art seminar rooms. The great majority of these courses satisfy arts and sciences core curriculum requirements. Each seminar is taught by an experienced faculty member, emphasizes discussion and writing, and ordinarily enrolls no more than 15 students. Beyond the classroom, HRAP fosters a variety of student-led activities, including evening events each week and a monthly lecture series that brings students into con-

tact with leading teachers and researchers from the university community.

Members of the Honors Residential Program draw on a rich variety of academic, advising, and informational resources made available by the program's joint sponsors, the College of Arts and Sciences, the Honors Program, and the Department of Housing. The Honors Program associate director who supervises HRAP's daily functioning maintains an office in Arnett Hall for academic advising and acts as liaison to the rest of campus.

**Eligibility:** Beginning each December, the Honors Program of the College of Arts and Sciences invites approximately 10 percent of all admitted students to participate in honors courses during their first year on campus; these invitations are issued on the basis of high school grade averages and scores on the Scholastic Aptitude Test (SAT) or American College Test (ACT). All students receiving an honors invitation are eligible to become members of the Honors Residential Academic Program on a first-come, first-served basis. Students who wish to participate in HRAP beyond the first year must maintain a University of Colorado GPA of 3.300 or above. Like participants in all other residential academic programs, HRAP members pay a participation fee in addition to the standard charges for tuition, fees, and room and board.

Students interested in the program should visit [www.colorado.edu/khp](http://www.colorado.edu/khp) for further information. Inquiries can be addressed by e-mail to [khp@colorado.edu](mailto:khp@colorado.edu); by telephone to the program office at 303-492-3695; and by postal mail to the Honors Residential Academic Program, University of Colorado at Boulder, 33 UCB, Boulder, CO 80309-0033.

### Leadership Program at Williams Village

This program is located at Williams Village and is dedicated to developing community, civic, and business leaders for a culturally diverse and democratic society. When a student enrolls in the Leadership Program they select one of two residential academic programs.

The Ethnic Living and Learning Community (ELLC) Leadership Studies Program provides students with a multicultural living and learning experience while studying leadership from a cultural and multi-disciplinary perspective.

The Chancellor's Leadership Studies Program (CLSP) offers leadership development and an understanding of how institutions and communities solve problems. Students learn different leadership styles needed to work effectively in those settings.

Students in both of these programs take leadership courses offered each semester that meet core requirements in the College of Arts and Sciences and may be applied toward graduation as well as a Certificate in the Study and Practice of Leadership. Students from all schools and colleges on the Boulder campus are eligible to participate.

There is a program participation fee of \$725. Scholarships are available to cover the cost of the fee for those with financial need. Contact the Leadership Program at Williams Village, University of Colorado at Boulder, 452 UCB, Boulder, CO 80309-0452, phone 303-735-1987, e-mail [CLR@colorado.edu](mailto:CLR@colorado.edu), or visit [www.colorado.edu/Chancellor/chancellorstrap](http://www.colorado.edu/Chancellor/chancellorstrap).

For additional information on this program, see the Other Academic Programs section.

### Libby Residential Academic Program

The Libby Arts Residential Academic Program (LRAP), now in its seventh year, is the first program on campus to unite the arts under one umbrella. LRAP is designed for first-year and second-

year students residing in Libby Hall who have an interest in the arts as a major, or who see arts courses as a corollary to a major in architecture, arts and sciences, business, or engineering. Classes satisfy core and major requirements or offer elective credit.

LRAP provides a unique living and learning experience with classes that are offered in specially equipped classrooms and studios in the Libby Residence Hall, taught by regular faculty from various departments as well as faculty with demonstrated excellence in teaching. (Past courses include Painting 2, World Art History, Introduction to World Dance and Culture, Introduction to Theatre, Introduction to Film Studies, Appreciation of Music.) In addition, a range of popular core curriculum classes are offered each year. Students need not have a previous background in any of the disciplines offered. During 2010-11 the program is limited to approximately 275 students, and class sizes are usually limited to 20-25 students. Thus, with students taking several classes together and living in the same residence hall, there is the opportunity to foster a small community within the larger university setting. Students enrolling in the program are required to take at least one course in the hall each semester. The director of the program and the office staff, located in Libby Hall, provide academic assistance to students throughout the year in planning their CU careers.

Residents are introduced to the diversity of the arts through an opening colloquium, community events, and other co-curricular activities. The opening colloquium, held before classes begin in the fall, brings students and faculty together for provocative and inspiring talks, presentations, performances, and discussions. Regular meetings are held during each semester to expose students to the breadth of the performing and visual arts, with opportunities to meet artists of both regional and national stature, as well as to view films of historical and contemporary significance. Other activities that meet students' interests and needs may also be organized.

The LRAP is jointly sponsored by the College of Arts and Sciences and the Department of Housing. Any arts and sciences major may enter the program. There is an annual nonrefundable charge for participation. Some university courses also charge course fees. There are a limited number of scholarships available. Students eligible for financial aid may request their budget be adjusted to include the program fee.

Students interested in the program may contact the program by writing to LRAP, University of Colorado, 175 UCB, Boulder, CO 80309-0175; by e-mailing [LibbyRAP@colorado.edu](mailto:LibbyRAP@colorado.edu); by telephoning 303-735-4211; or by visiting [www.colorado.edu/lrap](http://www.colorado.edu/lrap).

### Sewall Residential Academic Program

The Sewall Residential Academic Program (SRAP) is a program for first-year students enrolled in the College of Arts and Sciences who have an interest in the study of history and culture. Citizenship in the 21st century requires the ability to engage complex connections between the present and past, between local places and our global society, and between the arts and sciences. SRAP combines classes ranging from history and biology to economics and English, with co-curricular activities (such as lectures, films, and field trips) and local community outreach to help students recognize and think about these connections.

Limited to 330 students, SRAP provides the opportunity to enjoy the advantages of a small liberal arts college within the broader context of a large research university. The program offers a selection of small seminar-style classes (limited to approximately 18 students) that meet in the Sewall residence hall. Classes encourage active student participation and emphasize

analytical thought through intensive reading, discussion, and writing. Most SRAP courses also fulfill College of Arts and Sciences core requirements.

Each semester all SRAP students must take a 3-credit course at Sewall. All students are further required to take SEWL 2020 either fall or spring semester. In addition, students have the opportunity to take the lower-division writing course (WRTG 1150) at Sewall in either fall or spring semester.

SRAP facilitates a successful transition from high school to the university. Sewall courses are taught by faculty with a demonstrated excellence in teaching and a commitment to working closely with first-year students. Faculty members have offices conveniently located in Sewall Hall, which helps foster communication between students and faculty. Participants in the Sewall program are also fully involved in regular campus life, take the majority of their classes with the rest of the university, and are encouraged to join in all university activities.

The SRAP director, associate director, and program assistant are readily available to help students with planning schedules, making sense of the rules of the University and the College of Arts and Sciences, and choosing majors. They can refer students to other university resources for specialized counseling when necessary, and the housing department office offers free tutoring in many subject areas.

Interested first- and second-year students who are admitted into the College of Arts and Sciences should indicate Sewall Hall as their first choice on the housing application form and return it to the Housing Reservation Center as early as possible. Students are admitted on a first-come, first-served basis, determined by date of receipt of the housing application form. There is an extra charge for participating in the program in addition to regular tuition, fees, and room and board. Some scholarships are available; please contact the academic program office for details.

Students who have questions about the program should address them to the Director, Sewall Residential Academic Program, University of Colorado at Boulder, 353 UCB, Boulder, CO 80309-0353, visit the program online at [srap.colorado.edu](http://srap.colorado.edu), or call the SRAP office at 303-492-6004.

## Academic Excellence

### Dean's List

Students in the College of Arts and Sciences who have completed at least 12 credit hours of CU-Boulder course work for a letter grade in any single semester with a term GPA of 3.750 or better are included on the dean's list and receive a notation on their transcript and a letter from the dean.

### Graduation with Honors

The award of honors at graduation—cum laude, magna cum laude, or summa cum laude—is determined by the Honors Program of the college and is based on several criteria, including the quality of original scholarly work. Honors are not conferred on a graduate simply by virtue of high grades. Students pursuing multiple majors or multiple degrees must complete their honors program and defend their thesis by the published deadline for the term/year in which their first major or first degree is conferred. Students intending to pursue honors must register with the Honors Program by the deadlines published on the Honors Program website. Honors requirements must be complete prior to graduation. Students “walking” in May but graduating in August must complete honors requirements, including defending the thesis, by the Honors Program deadline for May graduation.

Interested students should consult the Honors Program listing in this catalog or contact the Honors Program in Norlin Library.

### Graduation with Distinction

Students will graduate “With Distinction” if they have at least 30 credit hours completed at the University of Colorado at Boulder, have a grade point average of 3.750 or higher for all course work completed at the University of Colorado, and have a cumulative grade point average of 3.750 or higher for all collegiate course work completed at all institutions attended. The average includes all grades except P.

### Phi Beta Kappa

Phi Beta Kappa is the nation's oldest and most prestigious honor society. The CU-Boulder chapter was established in 1904. Upper-division students whose undergraduate academic records fulfill certain requirements are eligible for election to membership in recognition of outstanding scholastic achievement in the liberal arts and sciences. Students are notified by mail of their nomination; students do not apply for Phi Beta Kappa membership.

## Academic Standards

### Good Academic Standing

Good academic standing in the college requires a cumulative grade point average of 2.000 (C) or above in all University of Colorado work. Grades earned at another institution are not used in calculating the grade point average at the University of Colorado (this includes courses taken at Metropolitan State College on the Denver campus). However, grades earned in another school or college within the University of Colorado system are used in determining a student's scholastic standing and progress toward the degree in the College of Arts and Sciences.

### Probation

Students whose cumulative grade point average falls below 2.000 are placed on probation. Those students who enroll in any term in the calendar year, excluding summers, after being placed on probation are expected to raise their grade point to a 2.000 or above overall by the end of that term. Neither CU-Boulder's summer session (including Maymester) nor enrollment through Boulder evening courses counts as a probationary semester. Students are not dismissed at the end of the summer term.

Students placed on academic probation who elect to remain out of school for a full calendar year can return to the university with a two-semester window to achieve the required cumulative GPA of 2.000 or above. Students on probation who return after a hiatus of one year are placed on a second probation at the end of the semester in which they return if their cumulative grade-point average remains below 2.000 and are dismissed from the university if they do not achieve a minimum 2.000 cumulative grade-point average by the end of the semester following the imposition of the second probation.

### Scholastic Dismissal

Students who still have a cumulative average below 2.000 after their semester of probation will be dismissed and will not be able to register for University of Colorado daytime courses on any campus during any academic year, August to May. Students dismissed from the college are eligible for readmission when they have achieved a cumulative 2.000 average by virtue of work done during the University of Colorado's summer term (any of the three campuses) and/or through the Division

of Continuing Education and Professional Studies (Boulder evening or correspondence courses). Students who choose to enroll in continuing education courses to restore their good standing must maintain a 2.500 GPA or above in each term in continuing education or be dismissed from both day classes and continuing education classes. They also may return as transfer students when they have overcome their deficiencies by enrolling at another institution (i.e., by achieving an overall 2.000 average in the University of Colorado work plus all work taken elsewhere since dismissal). These transfer grades are used only for the purpose of readmission and do not remain in the University of Colorado cumulative grade-point average. Dismissed students pursuing this latter option have two semesters after readmission to bring their University of Colorado grade point average up to 2.000 or they are dismissed again.

### Academic Ethics

A university's intellectual reputation depends on the maintenance of the highest standards of intellectual honesty. Commitment to those standards is a responsibility of every student and faculty member at the University of Colorado. Cheating; plagiarism; illegal possession and distribution of examinations or answers to specific questions; alterations, forgery, or falsification of official records; presenting someone else's work as one's own; or performing work or taking an examination for another student are examples of acts that may lead to suspension or expulsion. Reported acts of academic dishonesty must be referred to the Honor Council. The policies and procedures governing acts of academic dishonesty can be found on the Web at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

### Appeals and Petitions

The College of Arts and Sciences does not waive degree requirements or excuse students from completing degree requirements. Petitions for exceptions to the academic policies stated here may be submitted to the Appeals Committee on Academic Rules and Policies. Such petitions will be considered only if they meet all three of the following conditions:

1. The student must document that she/he has made every effort to fulfill the policy or requirement as defined and must demonstrate that no other options exist for fulfilling the requirement as defined in this catalog.
2. The student must document that she/he is prevented from fulfilling the policy or meeting the requirement as defined here for compelling reasons beyond the student's control.
3. The student must demonstrate to the satisfaction of the faculty committee that she/he has fulfilled or will fulfill the intent of the policy or the requirement through an appropriate alternative.

Students who believe that their circumstances meet the conditions to submit a petition must first consult with their academic advisor. If the advisor offers options for meeting the requirement or policy as defined here, the student must pursue those options and should not submit a petition.

The Appeals Committee on Academic Rules and Policies is located in the Academic Advising Center.

## General Credit and Enrollment Policies

Students are required to follow the graduation requirements listed in the catalog at the time of their initial entry onto the Boulder campus.

### Attendance

Successful work in the College of Arts and Sciences is dependent upon regular attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Failure to attend regularly may result in receipt of an *F* in a course. Students who, for illness or other legitimate reason, miss a final examination must notify the instructor or the Academic Advising Center no later than the end of the day on which the examination is given. Failure to do so may result in receipt of an *F* in the course.

### Credit Policies

#### *Advanced Placement Program*

See Undergraduate Admission in the General Information section.

#### *International Baccalaureate*

Any student admitted to a University of Colorado campus after June 30, 2003, who has graduated from high school having successfully completed an International Baccalaureate (IB) diploma, program will be granted 24 semester hours of college credit. No tuition will be charged for these credits. These credits will be granted, however, only if the student receives a score of 4 or better on an examination administered as part of the IB diploma program.

In addition, college credit is granted for International Baccalaureate examinations at the higher level with a score of 4 or better. For specific equivalencies, contact the Office of Admissions at 303-492-2458 or visit [www.ibo.org](http://www.ibo.org).

#### *College-Level Examination Program (CLEP)*

The College of Arts and Sciences accepts a limited number of hours of CLEP credit from subject (not general) examinations toward its bachelor's degree programs (see Undergraduate Admission for subjects accepted). In addition, certain CLEP examinations may be used to meet the minimum academic preparation standards (MAPS) for admission to the university. No more than 30 total credit hours of CLEP will apply, nor may CLEP credit be used in the final 30 credit hours presented for a degree.

CLEP tests are administered through Career Services, 303-492-5854.

#### *Cooperative Education/Internships*

Students in the College of Arts and Sciences may receive up to 9 credit hours for a department-sponsored cooperative education program or internship. A maximum of 6 of the 9 internship credits can be taken in the same department. Each internship project must be approved by the chair or associate chair of the department awarding the credit before the student enrolls in the course in order for the student to receive credit. Students are encouraged to contact their major department office or Career Services for information regarding the possibility of enrolling in a cooperative education program in their major. Many internships are graded on a *pass/fail* basis only. Participation in an internship with mandatory *pass/fail* grading does not affect the total credit hours of *pass/fail* a student may apply toward a

degree. Some departments further restrict the use of internship credit toward meeting major requirements.

For further information on internship credit, visit [www.colorado.edu/artsscience/aacforstudents/internapp.htm](http://www.colorado.edu/artsscience/aacforstudents/internapp.htm).

### ***Credit/No Credit***

Credit/no credit changes must occur during the schedule adjustment periods.

### ***Credit Taken as a Nondegree Student***

Once a student has been admitted to a degree program, credits from the Division of Continuing Education such as ACCESS, Boulder evening credit courses, and CU-Boulder correspondence classes may be eligible to be applied toward the degree. Students will receive initial advising during orientation once they have been accepted to a degree program in the College of Arts and Sciences.

### ***Credit Taken Outside the College of Arts and Sciences***

Students may apply a total of 30 credit hours from the other colleges and schools at CU-Boulder as well as specified ROTC and President's Leadership Class courses toward the fulfillment of requirements for the BA and BFA degrees. Within these 30 total hours, up to 8 credit hours in activities courses (applied music and ensembles) may be used. Transferred courses that were taught by departments considered to be outside the College of Arts and Sciences are counted as part of the allowed 30 hours. If a course has been approved to meet a core curriculum requirement and the course is taught outside the College of Arts and Sciences, the credit for this course will not be included as part of the 30 semester hour limitation.

### ***Cross-Listed Courses***

Courses that are cross-listed in two or more departments are credited in the department in which the student has the most semester hours, irrespective of the department in which the student formally enrolled for the course.

### ***Foreign Language Courses***

Students must receive a grade of C- or better to enroll in the next level of a language sequence. Students will not receive credit for a lower level course after credit has been given for a higher level course in the same sequence. For example, students who have passed a 2000-level class will not receive credit for a 1000-level class. Read the course descriptions carefully for restrictions, requirements, and prerequisites. This rule applies to the following languages: American Sign Language, Arabic, Chinese, Farsi, French, German, Greek, Hebrew, Hindi, Indonesian, Italian, Japanese, Korean, Latin, Norwegian, Polish, Portuguese, Russian, Spanish, and Swedish. Consult each department for specific restrictions, requirements, and prerequisites.

Some classes offered by foreign language departments are taught in English and require no knowledge of foreign language. Read specific course descriptions and check with the departments.

### ***Incomplete Grades***

An *I* grade is given at the discretion of the course instructor only when a student has satisfactorily completed a substantial portion of a course and, for reasons beyond the student's control, is prevented from completing all work for the course within the term. Incomplete grades must be requested by the student and should not be awarded by the instructor for non-attendance.

(In the case of non-attendance, the instructor should award the student the grade(s) earned.) If an incomplete grade is given, the instructor is required to document the reasons/grounds for the awarding of the incomplete grade, the specific work and conditions for completion of the course, and the time frame within which the course work must be completed. The maximum time the instructor can allow for the completion of the course work and subsequent award of a course grade is one year from the end of the term the course was taken. After one year, if no final grade is awarded, the *I* will change to the grade of *F*. A copy of the Incomplete Agreement (forms are available from the dean's office) signed by the student and instructor and accompanied by documentation of the extenuating circumstances that resulted in the awarding of an incomplete should be filed with the Assistant Dean's Office and with the instructor's department office, and a copy should be given to the student.

### ***Independent Learning***

A maximum of 30 credit hours of correspondence/online learning work may count toward the degree. Arts and sciences courses offered by the CU-Boulder Division of Continuing Education carry resident credit.

### ***Independent Study***

With departmental approval, students may register for independent study during the normal registration periods for each semester. Students may not register for more than 6 credit hours of independent study credit during any term. No more than 8 credit hours of independent study taken in a single department or program can be applied toward the total hours needed for graduation. A maximum of 16 hours of independent study may count toward the degree. The minimum expectation for each semester hour of credit is 25 hours of work.

A student may not use independent study projects to fulfill the college's general education requirements. Some departments further restrict the use of independent study hours toward meeting major requirements.

### ***Required Hours Outside the Major***

To complete the BA degree, students are required to complete a minimum of 75 credit hours outside their major department. Exceptions are:

- Students who complete designated departmental honors courses in their major and/or in honors thesis credit can reduce the 75 credit hours required outside the major department by a corresponding number of credits, up to a maximum of 6.
- Students completing the bachelor of fine arts degree must complete a minimum of 53 credit hours outside of their major department.

### ***Pass/Fail***

Students in the College of Arts and Sciences may not use the *pass/fail* option for courses taken to fulfill general education (core) requirements, courses used to satisfy the foreign language requirement, courses used to fulfill the Minimum Academic Preparation Standards (MAPS), courses used to complete minor requirements, or courses used to complete the minimum requirements for the major. A grade of *F* when earned in a course taken *pass/fail* will calculate into the GPA as a failing grade.

Students may take elective courses *pass/fail*, to a maximum of 6 credit hours. Courses offered only on a mandatory *pass/fail*

basis are excluded from the maximum allowed. The *pass/fail* option may be used only for elective credit.

### *Repetition of Courses*

If a student takes a course for credit more than once, all grades are calculated into the grade point average. However, the course is only counted toward graduation once, unless a course description specifically states that it can be taken more than once for credit.

### *ROTC Credit*

The ROTC courses listed below have been certified as acceptable college-level course work by the faculty of the College of Arts and Sciences or by other colleges and schools on the Boulder campus. These courses are counted as elective credit toward the degree, subject to the 30-semester-hour limitation on course work taken outside the college for students in the BA and BFA programs. Courses not included on this list do not count toward any degree requirements. Transfer ROTC course work must be evaluated as equivalent to course work on this list to count toward degree requirements.

AIRR 3010 and 3020

AIRR 4010 and 4020

MILR 1011 and 1021

MILR 2031 and 2041 (students may not receive credit for either course if they have credit in OPMG 3000)

MILR 4072 and 4082

NAVR 2020

NAVR 3030

NAVR 3040

NAVR 3101

NAVR 4010 and 4020

NAVR 4030

NAVR 4101

### *Transfer Credit*

Work from another accredited institution of higher education that has been completed with a grade of C- (1.70) or better may be transferred to the University of Colorado. Categories of transfer course work not accepted by the university are outlined in the Transfer Course Work Not Accepted by the University section under General Information.

All courses transferred from junior and community colleges carry lower-division credit. Courses transferred from four-year institutions carry credits at the level at which they were taught at the previous institution.

### *Statewide Guaranteed Transfer of General Education Courses*

Beginning in fall 2003, the two-year and four-year transfer articulation agreements among Colorado institutions of higher education were replaced by a statewide guaranteed transfer of approved general education courses taken at any Colorado public institution of higher education. Under the statewide guaranteed transfer program, up to 31–33 credits of successfully (C- or better) completed course work will automatically transfer and apply towards graduation requirements at the receiving institution. The course work must be drawn from the list of approved guaranteed transfer courses and must meet the distribution requirements of the guaranteed transfer program. Further information about the statewide transfer program, including the list of approved courses and distribution requirements, can be found at the website of the Colorado Department of Higher Education, [higherred.colorado.gov/Academics/Transfers/gtPathways/default.html](http://higherred.colorado.gov/Academics/Transfers/gtPathways/default.html).

Students who began their collegiate course work in fall 2003 or later at any Colorado public institution of higher education are subject to the statewide guaranteed transfer of approved general education courses. Students who began their collegiate course work prior to fall 2003 have the option of following the two-year and four-year articulation agreements in effect at the time of the student's initial matriculation at a Colorado public institution of higher education or following the conditions of the statewide guaranteed transfer program. Students who began their collegiate course work prior to fall 2003 must complete all lower-division core requirements by summer 2005 in order to remain eligible for the two-year and four-year core completion agreement.

Beginning in fall 2006, a student who graduates with an associate of arts or an associate of science degree from a Colorado community college and enters the College of Arts and Sciences will be exempt from the written communication requirement and the lower-division component of the core curriculum. Please note that students are still subject to the MAPS requirement.

Additional information on the evaluation of transfer credit of Colorado community college course work and its application in select arts and sciences major programs can also be found at [www.colorado.edu/artssciences/prospective/transfer.html](http://www.colorado.edu/artssciences/prospective/transfer.html).

### *Withdrawal*

See the General Information section for specific withdrawal procedures and universitywide policies.

Students in the College of Arts and Sciences who withdraw two semesters in a row will have a dean's stop placed on their registration. Summer session is not counted as a regular semester. They will not be permitted to return to CU-Boulder before one full academic year has elapsed (not including their semester of withdrawal). Arts and sciences students may withdraw from all classes for a term until the last day that classes are taught by requesting withdrawal in the Office of the Registrar. Students cannot withdraw after classes have ended for a term.

These policies also apply to arts and sciences students who are enrolled in continuing education courses.

### *Readmission*

Arts and sciences students who request readmission to the college are always readmitted to their major of record at the time they last attended the university. Readmitted students who desire to pursue a major different from their major of record must follow the college's process for declaring a new major (explained on the Academic Advising Center website, [www.colorado.edu/artssciences/aacforstudents](http://www.colorado.edu/artssciences/aacforstudents)) after they have been readmitted.

## **Undergraduate Degree Requirements**

Students are subject to the general degree requirements in effect at the time they first enter the Boulder campus of the University of Colorado and are subject to the major requirements in force at the time they declare the major. Arts and sciences students have 10 years to complete the requirements for a declared major. If the 10-year limit is exceeded, the student may be required to satisfy current major requirements. Students pursuing a major degree program identified for discontinuation by decision of the Board of Regents and the Colorado Commission on Higher Education have four years from the formal announcement of discontinuation to complete the degree program and graduate. The requirements, rules, and policies stated here apply to all



students first entering the Boulder campus during the 2008–09 academic year.

Students must complete a degree within 10 years. If it has been more than 10 years since matriculation into the College of Arts and Sciences and no degree has been completed, students may be subject to new curricula in place at the time of reenrollment. Please see the Minimum Major Requirements section for additional information on major requirements. Students may contact the Academic Advising Center for further assistance.

### Academic Advising and Orientation

Students in the college are expected to assume responsibility for planning their academic program in conjunction with their academic advisor in accordance with college rules and policies and with departmental major requirements. Any questions concerning these provisions are to be directed to the student's academic advisor or to the Academic Advising Center.

The college cannot assume responsibility for problems resulting from students failing to follow the policies stated in the catalog or from incorrect advice given by someone other than an appropriate staff member of the college.

All new students are required to attend a special orientation, advising, and registration program on campus before enrolling.

### Advising

Academic advising is an integral part of undergraduate education. The goal of all academic advising is to help students make responsible decisions as they develop educational plans compatible with their potential and with their career and life goals. Advising is more than the sharing of information about academic courses and programs; it includes encouraging students to formulate important questions about the nature and direction of their education and working with them to find answers to those questions. Advisors confer with students about alternative course schedules and other educational experiences, but students themselves are responsible for selecting the content of their academic program and making progress toward an academic degree.

As students progress through their academic program, their questions and concerns change. CU-Boulder offers a system of faculty and professional academic advisors to address these ongoing and multifaceted concerns.

Students are ultimately responsible for choosing appropriate courses, for registering accurately, and for meeting all degree requirements. Academic advisors assist students in clarifying their interests, values, and goals and help students relate these to academic programs and educational opportunities. As students work with their advisors, the advisors help students develop a coherent and balanced program of study that fulfills graduation requirements and assist students in identifying and integrating into their programs educational experiences outside the classroom that enhance their personal, intellectual, and professional development. Academic advisors also assist students in understanding academic policies, requirements, procedures, and deadlines.

Through the Open Option program, the Academic Advising Center provides comprehensive advising services to students who are undecided about their major or who are thinking of changing their major to another CU-Boulder college or school. Open option majors are assigned primary advisors in the advising center who are familiar with the courses and degree requirements for all majors offered at CU-Boulder and who assist students in exploring the degree programs related to the students' interests. While students are exploring majors, open option advisors assist students in designing programs of study that

meet graduation requirements while providing them with the academic flexibility to pursue whichever degree program they ultimately choose.

The advising center also provides preprofessional advising for all students who are preparing to pursue the study of law, medicine, or other professional health fields.

Students should refer to college, school, and departmental advising materials for specific details on their advising programs.

### Responsibilities of Students and Advisors

Within the advising system on the Boulder campus, both students and advisors have responsibilities.

Students are responsible for:

- knowing the requirements of their particular academic program, selecting courses that meet those requirements in an appropriate time frame, registering accurately, and monitoring their progress toward graduation;
- consulting with their academic advisor several times every term;
- scheduling and keeping academic advising appointments in a timely manner throughout their academic career, so as to avoid seeking advising only during busy registration periods; and
- being prepared for advising sessions (for example, by bringing in a list of questions or concerns, having a tentative schedule in mind, and/or being prepared to discuss interests and goals with their advisor);
- knowing and adhering to published academic deadlines;
- monitoring their position on registration waitlists;
- reading their CU e-mail on a weekly basis.

Advisors are responsible for:

- helping students clarify their values, goals, and abilities;
- helping students understand the nature and purpose of a college education;
- providing accurate information about educational options, requirements, policies, and procedures;
- helping students plan educational programs consistent with the requirements of their degree program and with their goals, interests, and abilities;
- assisting students in the continual monitoring and evaluation of their educational progress; and
- helping students locate and integrate the many resources of the university to meet their unique educational needs and aspirations.

### Four-Year Graduation

The College of Arts and Sciences has adopted a set of guidelines to define the conditions under which a student should expect to graduate in four years. More information is available through the Academic Advising Center and major program and departmental offices.

The University of Colorado at Boulder guarantees that if the scheduling of essential courses is found to have prevented a student in the College of Arts and Sciences from completing all course work necessary for a BA or BFA degree from the university by the end of the student's eighth consecutive fall and spring semester, the college will provide tuition plus any course fees for all courses required for completion of the degree requirements.

Students must satisfy all the conditions described below to be eligible for this guarantee.

This guarantee extends to all students who enrolled the summer of 1994 or after into the College of Arts and Sciences as first-semester freshmen without MAPS deficiencies and who satisfy all the requirements described below. This guarantee cannot be extended to include completion of a second major, a double degree, a minor, a teaching certificate, or other certificate program. Some CU-Boulder study abroad programs may not provide a sufficient range of courses to allow students to meet the requirements and thus students who participate in study abroad are not included in this guarantee.

#### *Four-Year Guarantee Requirements*

1. Students should enroll in University of Colorado at Boulder course work for eight consecutive fall and spring semesters.
2. No fewer than 60 credit hours of applicable course work should be completed with passing grades by the end of the second year (24 calendar months), 90 hours by the end of the third year (36 calendar months), and 120 hours by the end of the fourth year. Students should enroll in and pass an average of 15 credit hours each semester.
3. A minimum of 30 credit hours of college core-curriculum courses should be completed by the end of the second year, including college core-curriculum courses that also meet major requirements. All remaining college core-curriculum requirements must be fulfilled by the end of the eighth semester.
4. Students should complete 45 upper-division hours by the end of the eighth semester of study.
5. A GPA of at least 2.000 must be earned each semester.
6. Grades of C- or better in all course work required for the major should be earned, and students should have a cumulative GPA of 2.000 in all major course work attempted.
7. A recommended plan of study must be started toward the major no later than the start of the second semester of study (see note below for exceptions) and thereafter students must make adequate progress toward completing the major (defined by each major). A statement of adequate progress is available from the major or departmental office at the time the major is declared.
8. The major must be declared no later than the start of the second semester of study (see note below for exceptions), and students must remain in that major until graduation.
9. Students should meet with their assigned primary advisor for the major each semester.
10. Students must register each semester within one week of the assigned registration time.
11. Students should avoid taking courses that are in conflict with the written advice of their assigned primary advisor.
12. Students should adhere to the General Credit and Enrollment Policies and Minimum Major Requirements listed in the Arts and Sciences section.
13. Courses in conflict with major or college core curriculum requirements should be avoided.
14. The college should be notified in writing of the student's intent to graduate no later than the beginning of the seventh semester of study, and a graduation packet should be filed no later than the deadline for the appropriate graduation date (see Graduation Deadlines section).
15. Documentation should be kept proving that these requirements were satisfied (e.g., records of advising meetings attended, advising records and instructions, etc.).

The recommended plan of study for the following majors must be started in the first semester of study to be eligible for this guarantee: BA in biochemistry; chemistry; ecology and evolutionary biology; Japanese; integrative physiology; molecular, cellular, and developmental biology; geology; physics; and all majors that require foreign language course work when student proficiency falls below the entry-level language course of that major. Students seeking a BFA in dance or theatre must start the recommended plan of study for the corresponding BA program in the first semester of study and qualify for admission into the BFA program by the end of the third semester. Students seeking a BFA in film studies or fine arts must start the recommended plan of study for the corresponding BA program in the first semester of study and qualify for admission into the BFA program by the end of the fourth semester. If a student changes majors, the primary major advisor, in consultation with the College of Arts and Sciences assistant dean's office, will review the courses taken to date to determine whether the college will continue to extend the four-year guarantee.

#### **General Graduation Requirements**

Arts and sciences students must fulfill the following requirements for graduation:

1. Pass a total of 120 hours.
2. Maintain a 2.000 (C) grade point average in all University of Colorado work and a 2.000 (C) in all major course work attempted. (Some majors may require a higher minimum grade point average.)
3. Pass 45 credit hours of upper-division work (courses numbered in the 3000s and 4000s).
4. Arts and sciences students must complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus. Of these 45 credits, a minimum of 30 credits must be in arts and sciences upper-division credit hours completed as a matriculated student in the College of Arts and Sciences at the University of Colorado at Boulder and at least 12 of these upper-division hours must be in the major. A maximum of 6 credit hours taken at other University of Colorado campuses (UC Denver and CU-Colorado Springs) can be counted toward the minimum 45 credits required on the Boulder campus. Courses taken while on CU-Boulder study abroad programs, through CU-Boulder continuing education, or CU-Boulder correspondence courses are considered to be in residence.
5. For the bachelor of arts degree, students must complete a minimum of 75 hours outside their major department. Students who complete designated departmental honors courses in their major department and/or in honors thesis credit can reduce the 75 hours required outside the major department by a corresponding number of credits, up to a maximum of 6.
6. For the bachelor of fine arts degree, students must complete a minimum of 53 credit hours outside of their major.
7. Complete a major. Students are subject to the major requirements in force when they declare the major. See the sections Majors and Other Areas of Interest and Minimum Major Requirements in this section.

8. Complete the general education (college core curriculum) and MAPS requirements with the following limitations:
  - a. Although a single course may be listed in more than one core area, a student may use it to meet only one area requirement.
  - b. Neither independent study nor pass/fail courses may be used to meet MAPS deficiencies, core requirements, minor requirements, or the minimum major requirements.
  - c. A single course may be used to meet both MAPS and core requirements as long as the course is applicable to both requirements. For example, a student admitted with a MAPS deficiency in English composition may take WRTG 1150, First-Year Writing and Rhetoric, to satisfy both the MAPS requirement and the core curriculum lower-division written communication requirement.

This policy only applies to college level course work (CU or accepted transfer credit). If a student is exempt from a given core area, this does not exempt the student from fulfilling a MAPS deficiency in that area. A description of the College of Arts and Sciences MAPS requirements can be found in the General Information section.

Beginning in fall 2010, the Minimum Academic Preparation Standards for mathematics for the College of Arts and Sciences will be 4 units including 2 of algebra, 1 of geometry, and 1 of college preparatory math such as trigonometry, analytic geometry, or elementary functions. This will apply to students graduating from high school in spring 2010 and after.

## Core Curriculum

The mainstay of the general education requirements is the College of Arts and Sciences core curriculum. The core curriculum requirements are divided into two parts: skills acquisition and content areas of study. The following sections provide descriptions of the individual requirement areas, their underlying educational philosophies and goals, and the list of approved courses. The updated list of approved core courses is located on the college's website at [www.colorado.edu/artssciences/students/undergraduate/core.html](http://www.colorado.edu/artssciences/students/undergraduate/core.html).

### Exemptions

Selected majors and the ecology and evolutionary biology minor are exempt from portions of the core curriculum, as core course work is considered equivalent to course work in the major. Students who graduate with more than one exempt major may apply their exemptions cumulatively.

### Skills Acquisition

These requirements are designed to assure that each student has attained a minimum level of competency in each of the areas listed: foreign language, quantitative reasoning and mathematical skills, and written communication.

Although a single course may appear in several areas, students may use it to meet only one core requirement.

**1. Foreign Language.** All students are required to demonstrate, while in high school, third-level proficiency in a single modern or classical foreign language. Students who have not met this requirement at the time of matriculation will have a MAPS deficiency. They may make up the deficiency only by passing an appropriate third-semester college course or by passing a CU-Boulder approved proficiency examination. Students who take approved CU-Boulder course work to fulfill this requirement

must take the course for a letter grade and receive a passing grade of *D-* or higher.

Students who are under the core curriculum, but not subject to MAPS, must complete the foreign language requirement to meet degree requirements.

Questions about placement should be referred to the appropriate foreign language department.

The goal of the language requirement is to encourage students to confront the structure, formal and semantic, of another language, significant and difficult works in that language, and one or more aspects of the culture lived in that language. This enables students to understand their own language and culture better, analyze texts more clearly and effectively, and appreciate more vividly the dangers and limitations of using a translated document. The language requirement is a general education requirement and so concentrates on reading. In some languages other abilities may be emphasized as well. Understanding what it means to read a significant text in its original language is essential for general education according to the standards of this university.

CU-Boulder courses that satisfy this requirement include the following:

- \*ARAB 2110-3 Second Year Arabic 1
- CHIN 2110-5 Intermediate Chinese 1
- CHIN 2150-5 Intensive Second-Year Chinese
- \*CLAS 2114-4 Intermediate Latin 1
- CLAS 3113-3 Intermediate Classical Greek 1
- \*FREN 2110-3 Second-Year French Grammar Review and Reading 1
- FRSI 2010-4 Intermediate Farsi 1
- \*GRMN 2010-4 Intermediate German 1
- GRMN 2030-5 Intensive Intermediate German
- \*HEBR 2110 (3-4) Intermediate Hebrew I
- HIND 2010-5 Intermediate Hindi 1
- INDO 2010-4 Intermediate Indonesian 1
- \*ITAL 2110-3 Intermediate Italian Reading, Grammar, and Composition 1
- JPNS 2110-5 Intermediate Japanese 1
- KREN 2110-5 Second-Year Intermediate Korean 1
- \*NORW 2110-4 Second-Year Norwegian Reading and Conversation 1
- \*PORT 2110-3 Second-Year Portuguese 1
- \*RUSS 2010-4 Second-Year Russian 1
- SLHS 2325-4 American Sign Language 3
- \*SPAN 2110-3 Second-Year Spanish 1
- \*SPAN 2150-5 Intensive Second-Year Spanish
- \*SWED 2110-4 Second-Year Swedish Reading and Conversation 1

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

**2. Quantitative Reasoning and Mathematical Skills (QRMS) (3–6 semester hours).** Liberally educated people should be able to think at a certain level of abstraction and to manipulate symbols. This requirement has two principal objectives. The first is to provide students with the analytical tools used in core curriculum courses and in their major areas of study. The second is to help students acquire the reasoning skills necessary to assess adequately the data which will confront them in their daily lives. Students completing this requirement should be able to: construct a logical argument based on the rules of inference; analyze, present, and interpret numerical data; estimate orders of magnitude as well as obtain exact results when appropriate; and apply mathematical methods to solve problems in their university work and in their daily lives.

Students can fulfill the requirement by passing one of the courses or sequences of courses listed below or by passing the CU-Boulder QRMS proficiency exam. Students who take ap-

proved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of D- or higher.

ECEN 1500-3. Sustainable Energy

ECEN 1078-3 Mathematical Tools for Economists 1

\*MATH 1012-3 Quantitative Reasoning and Mathematical Skills (same as QRMS 1010)

MATH 1110-3 and 1120-3 The Spirit and Uses of Mathematics 1 and 2

MATH 1130-3 Mathematics From the Visual Arts (same as QRMS 1130)

\*MATH 1150-4 Precalculus Mathematics

\*MATH 1410-3 Mathematics for Secondary Educators

\*MATH 2380-3 Mathematics for Environment (same as QRMS 2380)

PHYS 1010-3 Physics of Everyday Life 1

PHYS 1020-4 Physics of Everyday Life 2

PSCI 2075-3 Quantitative Research Methods

PSCI 3105-3 Designing Social Inquiry

Any 3-credit math module: MATH 1011-3, MATH 1071-3, or MATH 1081-3.

Any 3 credits of mathematics courses numbered \*MATH 1300 and above or applied mathematics courses numbered \*APPM 1350 and above.

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

**3. Written Communication (3 lower-division and 3 upper-division semester hours).** Writing is a skill fundamental to all intellectual endeavors. While some college courses require more writing than others, good writing is recognized as a necessary means of communication in every scholarly discipline. The core curriculum promotes the principle that ideas do not exist apart from language, and thus content cannot be isolated from style. For ideas to flourish, they must be expressed clearly and gracefully, so that readers take pleasure while taking instruction. Students may meet the lower-division component of this requirement by first passing one of the approved lower-division courses or by receiving a score of 4 or 5 on the English Language and Composition Advanced Placement exam. Students may then complete the upper-division component of this requirement by passing one of the approved upper-division courses or by passing the written communication proficiency exam. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of D- or higher.

#### Lower-division Courses

ARSC 1080-4 College Writing and Research

ARSC 1150-3 Writing in Arts and Sciences

ENGL 1001-3 Freshman Writing Seminar

IPHY 1950-3 Introduction to Scientific Writing in Integrative Physiology

\*WRTG 1100-4 Extended First-Year Writing and Rhetoric

\*WRTG 1150-3 First-Year Writing and Rhetoric

WRTG 1250-3 Advanced First-Year Writing and Rhetoric

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

#### Upper-division Courses

ARSC 3100-3 Multicultural Perspective and Academic Discourse

EBIO 3940-3 Argument in Scientific Writing

ENVS 3020-3 Advanced Writing in Environmental Studies

\*HONR 3220-3 Advanced Honors Writing Workshop

IPHY 3700-3 Scientific Writing in Integrative Physiology

PHIL 3480-3 Critical Thinking and Writing in Philosophy

\*PHYS 3050-3 Writing in Physics: Problem Solving and Rhetoric

RLST 3020-3 Advanced Writing in Religious Studies

WMST 3800-3 Advanced Writing in Feminist Studies

\*WRTG 3007-3 Writing in the Visual Arts

WRTG/NRLN 3020-3 Topics in Writing

\*WRTG 3030-3 Writing on Science and Society

\*WRTG 3035-3 Technical Communication and Design

WRTG 3040-3 Writing on Business and Society

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

#### Content Areas of Study

**4. Historical Context (3 semester hours).** Courses that fulfill this requirement enable students to study historical problems or issues and to develop an understanding of earlier ideas, institutions, and cultures.

Courses explore the times and circumstances in which social, intellectual, artistic or other developments occurred. The purpose of this exploration is to analyze subjects in their context, that is, to investigate both the processes and the meanings of change. Among the educational aims of these courses are the following: to contribute to historical perspectives that may help to clarify issues that arise today or will arise tomorrow, to arouse the curiosity of students concerning historical conditions that may be relevant to subjects studied in other courses, and to expand the imagination by generating an awareness of the diverse ways in which our common humanity has expressed itself.

Students may choose to meet this 3-hour requirement by passing any course listed below. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of D- or higher.

ANTH 1180-3 Maritime People: Fishers and Seafarers

ANTH 1190-3 Origins of Ancient Civilizations

ANTH/CLAS 2009-3 Modern Issues, Ancient Times

ARAB 3230-3 Islamic Culture and Iberian Peninsula

ARTH/CLAS 1509-4 Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World

ARTH/CLAS 2019-3 Pompeii and the Cities of Vesuvius

ASIA 1000-3 Introduction to South and Southeast Asian Civilizations

\*CEES /HIST 2002-3 Introduction to Central and East European Studies

CLAS 1030/\*PHIL 1010-3 Introduction to Western Philosophy: Ancient

CLAS/\*HIST 1051-3 The World of Ancient Greeks

CLAS/\*HIST 1061-3 The Rise and Fall of Ancient Rome

\*CLAS 1140-3 Bread and Circuses: Society and Culture in the Roman World

ECON 4514-3 Economic History of Europe

ENGL 3164/HIST 4164-3 History and Literature of Georgian England

ENGL 4113-3 History and Culture of Medieval England

GRMN 2301-3 Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich

\*HIST 1010-3 Western Civilization 1: Antiquity to the 16th Century

\*HIST 1020-3 Western Civilization 2: 16th Century to the Present

\*HIST 1038-3 Introduction to Latin American History

\*HIST 1040-3 Honors: Western Civilization 2

\*HIST/JWST/GSLL 1108-3 Introduction to Jewish History

\*HIST 1208-3 Sub-Saharan Africa to 1800

HIST 1308-3 Introduction to Middle Eastern History

\*HIST 1408-3 Introduction to South Asian History

\*HIST 1608-3 Introduction to Chinese History

\*HIST 1708-3 Introduction to Japanese History

HIST 2100-3 Revolution in History

HIST 2103-3 History of England to 1660

HIST 2112-3 Early Modern Societies (1450–1700)

\*HIST 2123-3 History of England 1660 to Present

\*HIST 2170-3 History of Christianity 1: To the Reformation

HIST 2180-3 History of Christianity 2: From the Reformation

\*HIST 2222-3 War and Society in the Modern World

HIST 2319-3 Introduction to Islam

\*HIST 2543-3 Medieval Societies  
 HIST 2629-3 China in World History  
 HONR 2251-3 Introduction to the Bible  
 HUMN 1010-6 Introduction to Humanities 1  
 HUMN 1020-6 Introduction to Humanities 2  
 JWST/RLST 3100-3 Judaism  
 LIBB 1700-3 The History of Communication from Caves to Cyberspace  
 \*PHIL 1020-3 Introduction to Western Philosophy: Modern  
 PHIL 3000-3 History of Ancient Philosophy  
 PHIL 3010-3 History of Modern Philosophy  
 PHIL 3410-3 History of Science: Ancients to Newton  
 PHIL 3430-3 History of Science: Newton to Einstein  
 RLST 3000-3 The Christian Tradition  
 RUSS 2211-3 Introduction to Russian Culture  
 RUSS 2221-3 Introduction to Modern Russian Culture  
 \*RUSS 2471-3 Women in Russian Culture: From Folklore to the 19th Century  
 RUSS 3601-3 Russian Culture Past and Present  
 RUSS 4301-3 American-Russian Cultural Relations  
 SCAN 2202-3 The Vikings

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

**5. Human Diversity (3 semester hours).** Courses fulfilling this requirement increase the student's understanding of the world's diversity and pluralism through the study of two broad and interrelated areas: (1) the nature and meaning of diversity and the experience of marginalized groups; and (2) cultures other than those of Europe and the United States. This requirement explicitly identifies an awareness and understanding of pluralism as essential to a liberal education.

(1) **Gender, Ethnic, and Social Diversity.** Courses in this area are designed to expand the range of each student's understanding of the experience of individuals and groups who, because of such fundamental components of identity as race, ethnicity, gender, or other characteristics, have been historically marginalized by society and placed outside of the mainstream. Generally courses will explore the ways in which marginalization has occurred and the reasons for this marginalization. The intent is to expand understanding of these social groups with the goal of identifying the way social categories shape human thought and experience.

(2) **Non-Western Cultures.** These courses are designed to expand the range of the student's understanding of cultures that are not derived principally from the western experience. A comparative perspective introduces students to the commonality and diversity of cultural responses to universal human problems. Each course seeks to cultivate insight into and respect for diversity by requiring students to explore a cultural world quite different from their own.

Courses satisfying this requirement are intended to portray culture in the most integrated sense, including aspects of material adaptation, social pattern, ideas and values, and aesthetic achievement.

Students are required to pass 3 hours of course work from any course listed below. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of *D-* or higher. Students who graduate with a major in ethnic studies are exempt from completing the human diversity requirement.

\*ANTH 1100-3 Exploring a Non-Western Culture: The Tamils  
 ANTH 1105-3 Exploring a Non-Western Culture: Tibet  
 ANTH 1110-3 Exploring a Non-Western Culture: Japan  
 ANTH 1115-3 The Caribbean in Post-Colonial Perspective

ANTH 1120/ETHN 1123-3 Exploring a Non-Western Culture: Hopi and Navajo, Cultures in Conflict (formerly AIST 1125/ANTH 1120)  
 ANTH 1140-3 Exploring a Non-Western Culture: The Maya  
 ANTH 1150-3 Exploring a Non-Western Culture: Regional Cultures of Africa  
 ANTH 1160-3 The Ancient Egyptian Civilization  
 ANTH 1170-3 Exploring Culture and Gender through Film  
 ANTH 4560/ETHN 4563-3 North American Indian Acculturation (formerly AIST 4565/ANTH 4560)  
 ARTH 3209-3 Art, Culture, and Gender Diversity, 1400–1600: Renaissance Art Out of the Canon  
 ARTH/CLAS 4269-3 Art and Archaeology of the Ancient Near East  
 ARTH/WMST 4769-3 Gender Studies in Early Modern Visual Culture  
 ARTS 4191-3 Digital Photography in Mongolia  
 \*ASIA 1000-3 Introduction to South and Southeast Asian Civilizations  
 ASTR 2000-3 Ancient Astronomies of the World  
 CHIN 1061-3 Boudoirs, Books, Battlefields: Voices and Images of Chinese Women  
 CHIN 3451-3 Language and Gender in China  
 CLAS/WMST 2100-3 Women in Ancient Greece  
 \*CLAS/WMST 2110-3 Women in Ancient Rome  
 COMM 3410-3 Intercultural Communication  
 EALC 1011-4 Introduction to Traditional East Asian Civilizations  
 EALC 1021-(3-4) East Asian Civilizations: Modern Period  
 ECON 4626-3 Economics of Inequality and Discrimination  
 EDUC 3013-(3-4) School and Society  
 ENGL/WMST 1260-3 Introduction to Women's Literature  
 ENGL 1800-3 American Ethnic Literatures  
 ENGL/JWST 3677-3 Jewish-American Fiction and Old World Backgrounds  
 ETHN 1016-3 Introduction to Chicano Studies (formerly CHST 1015)  
 ETHN 1025-3 Introduction to Asian American Studies (formerly AAST 1015)  
 ETHN 1036-3 Chicano Fine Arts and Humanities (formerly CHST 1031)  
 ETHN 2002-3 Introduction to Black Studies (formerly BLST 2000)  
 ETHN 2003-3 Introduction to American Indian Studies: Precontact Native America (formerly AIST 2000)  
 ETHN 2013-3 Topical Issues in Native North America (formerly AIST 2015)  
 ETHN 2215-3 The Japanese American Experience (formerly AAST 2210)  
 ETHN 2232-3 Contemporary Black Protest Movements (formerly BLST 2200)  
 \*ETHN 2242-3 Black Social and Political Thought (formerly BLST 2210)  
 ETHN 2432/HIST 2437-3 African American History (formerly BLST/HIST 2437)  
 ETHN 2536/HIST 2537-3 Chicano History (formerly CHST/HIST 2537)  
 \*ETHN 2703/RLST 2700-3 American Indian Religious Traditions (formerly AIST/RLST 2700)  
 ETHN 3012/PSCI 3101-3 Black Politics (formerly BLST/PSCI 3101)  
 ETHN 3032-3 African American Family in U.S. Society (formerly BLST 3023)  
 ETHN 3136/WMST 3135-3 Chicana Feminisms and Knowledges (formerly CHST/WMST 3135)  
 ETHN 3156-3 Folklore and Mythology of the Hispanic Southwest (formerly CHST 3153)  
 ETHN 3201/INVS/LDSP 3100 (3-4) Multicultural Leadership: Theories, Principles and Practices (formerly ETHN 3200/INVS 3100)  
 ETHN 3213/WMST 3210-3 American Indian Women (formerly AIST/WMST 3210)  
 ETHN 3671-3 Fight the Power: People of Color and Social Movement Struggles (formerly ETHN 3675)  
 ETHN 4136/PSCI 4131-3 Latinos and the U.S. Political System (formerly CHST 4133/PSCI 4131)  
 \*FARR/LDSP 2400-3 Understanding Privilege and Oppression in Contemporary Society  
 FILM 3013-3 Women and Film  
 \*FREN/ITAL 1400-3 Medieval/Renaissance Women Writers in Italy and France  
 \*FREN 1700-3 Francophone Literature in Translation  
 \*FREN 1750-3 French Colonialism: North Africa and the Middle East  
 FREN 3800-3 France and the Muslim World  
 GEOG/WMST 3672-3 Gender and Global Economy  
 GEOG 3822-3 Geography of China  
 GRMN/JWST 3501-3 Jewish-German Writers: Enlightenment to Present Day  
 GRMN/WMST 3601-3 German Women Writers  
 GRMN/WMST 4301-3 Gender, Race, and Immigration in Germany and Europe  
 HEBR/JWST 2350-3 Introduction to Jewish Culture

HEBR/JWST 3202-3 Women, Gender, and Sexuality in Jewish Texts and Traditions  
 HIND 3811-3 The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature (formerly HNDI 3811)  
 \*HIST 2616-3 Women's History  
 \*HIST 2626-3 Gender and Culture  
 HONR 1810-3 Honors Diversity Seminar  
 HONR/WMST 3004-3 Women in Education  
 HONR 4025-3 Heroines and Heroic Tradition  
 HUMN 2145-3 African America in the Arts  
 HUMN/ITAL 4150-3 The Decameron and the Age of Realism  
 HUMN/ITAL 4730-3 Italian Feminisms: Culture, Theory, and Narratives of Difference  
 KREN 1011-3 Introduction to Korean Civilization  
 KREN 3441-3 Religion and Culture in Korea  
 \*LGBT 2000/WMST 2030-3 Introduction to Lesbian, Gay, Bisexual, and Transgender Studies  
 \*LIBB 1600-3 Gender and Film  
 LING 2400-3 Language and Gender  
 LING 3220-3 American Indian Languages in Social-Cultural Context  
 MUEL 2772-3 World Musics  
 PHIL 2270-3 Philosophy and Race  
 PHIL/WMST 2290-3 Philosophy and Women  
 PSCI 3301/WMST 3300-3 Gender, Sexuality, and U.S. Law  
 PSCI/WMST 4271-3 Sex Discrimination: Constitutional Issues  
 PSCI/WMST 4291-3 Sex Discrimination: Federal and State Law  
 PSYC/WMST 2700-3 Psychology of Contemporary American Women  
 \*RLST/WMST 2800-3 Women and Religion  
 RUSS/WMST 4471-3 Women in 20th Century Russian Culture  
 SCAN 3206-3 Nordic Colonialism  
 SCAN/WMST 3208-3 Women in Nordic Society: Modern States of Welfare  
 \*SOCY/WMST 1016-3 Sex, Gender, and Society 1  
 SOCY/WMST 3012-3 Women, Development, and Fertility  
 WMST 2000-3 Introduction to Feminist Studies  
 WMST 2020-3 Social Construction of Femininities and Masculinities  
 WMST 2050-3 Gender and Contemporary Culture  
 WMST 2200-3 Women, Literature, and the Arts  
 WMST 3670-3 Immigrant Women in the Global Economy

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

**6. United States Context (3 semester hours).** Courses fulfilling the United States Context requirement explore important aspects of culture and society in the United States. They stimulate critical thinking and an awareness of the place of the United States in the world by promoting an understanding of the world views that the environment, culture, history, and values of the United States have fostered. They are required to include some discussion of the realities and issues related to matters of ethnic and racial diversity that characterize the nation's ongoing experience. These courses familiarize students with the United States and enable them to evaluate it critically.

These courses teach an appreciation of United States culture while inviting students to ask probing questions about values and ideals that are understood to be an integral part of the United States. Some of the questions that might be addressed in these courses are: How have citizens and other residents of the United States derived a sense of identity from geography, language, politics, and the arts? How do people in the United States view and influence the world beyond the nation's borders? How have the rights and responsibilities of citizenship changed over time? How have U.S. citizens and residents in the United States dealt with opposing values? Completing this requirement, students will develop both a better understanding of the United States, present and past, and a considerable interest in the nation's future.

This 3-hour requirement may be fulfilled by passing any course listed below. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of *D-* or higher.

ANTH 3170-3 America: An Anthropological Perspective  
 ARTH 3509-3 American Art (formerly AMST 3509)  
 BAKR 1500-3 Colorado: History, Ecology, and Environment  
 \*CAMW 2001-3 The American West  
 ECON 4524-3 Economic History of the U.S.  
 ECON 4697-3 Industrial Organization and Regulation  
 \*ETHN 2004-3 Themes in American Culture 1 (formerly AMST 2000)  
 ETHN 2013-3 Topical Issues in Native North America (formerly AIST 2015)  
 ETHN 2014-3 Themes in American Culture 2 (formerly AMST 2010)  
 ETHN 2432/HIST 2437-3 African American History (formerly BLST/HIST 2437)  
 ETHN 2536/HIST 2537-3 Chicano History (formerly CHST/HIST 2537)  
 ETHN 3015-3 Asian Pacific American Communities (formerly AAST 3013)  
 ETHN 3032-3 African American Family in U.S. Society (formerly BLST 3023)  
 ETHN 3905/WMST 3900-3 Asian American Women (formerly AAST/AMST/WMST 3900)  
 ETHN 4504-3 American Autobiography (formerly AMST 4500)  
 \*HIST 1015-3 History of the United States to 1865  
 \*HIST 1025-3 History of the United States since 1865  
 \*HIST 1035-3 Honors: History of the United States to 1865  
 HIST 1045-3 Honors: History of the United States since 1865  
 \*HIST 2015-3 The History of Early America  
 HIST 2117-3 History of Colorado  
 HIST 2126-3 Modern U.S. Politics and Diplomacy  
 HIST 2166-3 The Vietnam Wars  
 \*HIST 2215-3 The Era of the American Revolution  
 \*HIST 2227-3 History of the American Southwest  
 HIST 2316-3 History of American Popular Culture  
 \*HIST 2326-3 Issues in American Thought and Culture  
 HIST 2516-3 America through Baseball  
 \*HIST 2636/WMST 2400-3 Women of Color and Activism  
 HIST 2717-3 Introduction to Asian American History  
 \*HIST 2746-3 Christianity in American History  
 HIST 2837-3 Topics in American Working Class History  
 \*HIST 2866-3 American History and Film  
 HUMN 2145-3 African America in the Arts  
 \*INVS 1523-3 Civic Engagement: Democracy as a Tool for Social Change  
 LING 1000-3 Language in U.S. Society  
 MUEL 2752-3 Music in American Culture  
 \*PHIL 1200-3 Philosophy and Society  
 PHIL 2220-3 Philosophy and Law  
 \*PSCI 1101-3 American Political System  
 PSCI 3011-3 The American Presidency  
 PSCI 3021-3 U.S. Campaigns and Elections  
 PSCI 3054-3 American Political Thought  
 PSCI 3061-3 State Government and Politics  
 PSCI 3071-3 Urban Politics  
 PSCI 3163-3 American Foreign Policy  
 PSCI 3171-3 Government and Capitalism in the U.S.  
 PSCI 4021-3 Legislatures and Legislation  
 RLST 2500-3 Religion in the United States  
 RLST 3050-3 Religion and Literature in America  
 RUSS 4301-3 American-Russian Cultural Relations  
 \*SOCY 1021-3 U.S. Race and Ethnic Relations  
 SOCY/WMST 3016-3 Marriage and the Family in U.S. Society  
 SOCY 3151-3 Self in Modern Society

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

**7. Literature and the Arts (6 semester hours, 3 of which must be upper division).** These courses promote a better understanding of fundamental aesthetic and cultural issues. They sharpen critical and analytical abilities so that students may develop a deeper

appreciation of works of art. The goal of this requirement is to enhance the student's ability to read critically, to understand the elements of art, and to grasp something of the complex relations between artist and public, and between art work and cultural matrix. The emphasis in courses which fulfill this requirement is on works that are generally recognized as central to and significant for one's cultural literacy and thereby enhance the student's understanding of our literary and artistic heritage.

Courses stress literary works as well as the history and criticism of literature and the arts. They may utilize creative projects as a means of arriving at a better understanding of the art form, but students may not use studio or performance classes to satisfy this requirement.

Students are required to pass 6 hours of course work in literature and the arts, of which at least 3 hours must be upper division, unless either HUMN 1010 or 1020 is completed. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of D- or higher.

If students graduate with a major dealing in depth with literature and the arts (Chinese, classics, dance, English, fine arts, French, Germanic studies, humanities, Italian, Japanese, Portuguese, Russian, Spanish, or theatre), they are exempt from this requirement.

Courses offered at CU-Boulder that satisfy this requirement include the following:

#### Lower-division Courses

- \*ARTH 1300-3 History of World Art 1
- \*ARTH 1400-3 History of World Art 2
- ARTH/CLAS 1509-4 Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World
- ARTH 1709-3 Experiencing Art: Image, Artist, and Idea
- \*ARTH 2409-3 Introduction to Asian Arts
- CHIN 1051-3 Masterpieces of Chinese Literature in Translation
- \*CHIN 2441-3 Film and the Dynamics of Chinese Culture
- CLAS 1100-3 Greek Mythology
- CLAS 1110-3 Masterpieces of Greek Literature in Translation
- CLAS 1115-3 Honors: Masterpieces of Greek Literature in Translation
- \*CLAS 1120-3 Masterpieces of Roman Literature in Translation
- \*DNCE 1027-3 Introduction to Dance and Culture (formerly DNCE 1029)
- ENGL 1500-3 Masterpieces of British Literature
- ENGL 1600-3 Masterpieces of American Literature
- FARR 2002-3 Literature of Lifewriting
- FREN 1200-3 Medieval Epic and Romance
- FREN 1900-3 Modern Paris in Literature, Photographs, Paintings, and Movies
- GRMN 1602-3 Metropolis and Modernity
- GRMN 2501-3 20th Century German Short Story
- \*GRMN 2503-3 Fairy Tales of Germany
- \*GRMN/HUMN 2601-3 Kafka and the Kafkaesque
- HONR 2860-3 The Figure of Socrates
- HUMN 1010-6 Introduction to Humanities 1
- HUMN 1020-6 Introduction to Humanities 2
- HUMN 2100-3 Arts, Culture, and Media
- ITAL 1600-3 Strategies of Fear: Introduction to Italian Fantastic Literature
- JPNS 1051-3 Masterpieces of Japanese Literature in Translation
- MUEL 1832-3 Appreciation of Music
- MUEL 2852-3 Music in the Rock Era
- MUEL 2862-3 American Film Musical, 1926–1954
- \*RUSS 2231-3 Fairy Tales of Russia
- SCAN 1202-3 Tolkien's Nordic Sources and *The Lord of the Rings*
- \*SPAN 1000-3 Cultural Difference through Hispanic Literature
- \*THTR 1009-3 Introduction to Theatre
- \*THTR 1011-3 Development of Theatre 1: Classical Theatre and Drama
- WMST 2200-3 Women, Literature, and the Arts

\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program

can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).

#### Upper-division Courses

- ARTH/CLAS 3039-3 Greek Art and Archaeology
- ARTH/CLAS 3049-3 Roman Art and Architecture
- ARTH 4329-3 Modern Art 1
- ARTH 4759-3 17th Century Art and the Concept of the Baroque
- CHIN/HUMN 3341-3 Literature and Popular Culture in Modern China
- CHIN 3351-3 Reality and Dream in Traditional Chinese Fiction
- CLAS/HUMN 4110-3 Greek and Roman Epic
- CLAS/HUMN 4120-3 Greek and Roman Tragedy
- CLAS/HUMN 4130-3 Greek and Roman Comedy
- DNCE 3029-3 Looking at Dance
- DNCE 4017-3 History and Philosophy of Dance
- ENGL 3000-3 Shakespeare for Nonmajors
- ENGL 3060-3 Modern and Contemporary Literature
- FILM/RUSS 3211-3 History of Russian Cinema
- FILM 3402-3 European Film and Culture
- FREN 3200-3 Introduction to Literary Theory and Advanced Critical Analysis
- FREN 4300-3 Theatre and Modernity in 17th Century France
- GRMN 3502-3 Literature in the Age of Goethe
- GRMN/HUMN 3702-3 Dada and Surrealist Literature
- GRMN/HUMN 4504-3 Goethe's *Faust*
- HUMN 3660-3 The Postmodern
- HUMN 4135-3 Art and Psychoanalysis
- HUMN/ITAL 4140-3 The Age of Dante: Readings from *The Divine Comedy*
- HUMN/ITAL 4150-3 The Decameron and the Age of Realism
- HUMN/RUSS 4811-3 19th Century Russian Literature in Translation
- HUMN/RUSS 4821-3 20th Century Russian Literature and Art
- ITAL 4600-3 Once Upon a Time in Italy
- MUEL 3822-3 Words and Music
- MUEL 3832-3 Music in Literature
- RUSS 4831-3 Contemporary Russian Literature
- SCAN 3202-3 Old Norse Mythology
- SCAN 3203-3 19th and 20th Century Nordic Literature
- SCAN 3204-3 Medieval Icelandic Sagas
- SCAN 3205-3 Scandinavian Folk Narrative
- SCAN 3506-3 Scandinavian Drama
- THTR 3011-3 Development of the American Musical Theatre

**8. Natural Science (13 semester hours, including a two-course sequence and a laboratory or field experience).** These courses study the nature of matter, life, and the universe. They enhance literacy and knowledge of one or more scientific disciplines, and enhance those reasoning and observing skills that are necessary to evaluate issues with scientific content. Courses are designed to demonstrate that science is not a static list of facts, but a dynamic process that leads to knowledge. This process is one of subtle interplay between observation, experimentation, and theory, enabling students to develop a critical view toward the conclusions and interpretations obtained through the scientific process.

Through a combination of lecture courses and laboratory or field experiences, students gain hands-on experience with scientific research. They develop observational skills of measurement and data interpretation and learn the relevance of these skills to the formation and testing of scientific hypotheses.

The goal of this requirement is to enable students to understand the current state of knowledge in at least one scientific discipline, with specific reference to important past discoveries and the directions of current development; to gain experience in scientific observation and measurement, in organizing and quantifying results, in drawing conclusions from data, and in understanding the uncertainties and limitations of the results; and to acquire sufficient general scientific vocabulary and methodology to find additional information about scientific issues, to evaluate it critically, and to make informed decisions.

The natural science requirement, which consists of passing 13 hours of approved natural science course work, includes one two-semester sequence of courses and at least 1 credit hour of an associated lab or field experience. No more than two lower-division courses may be taken from any single department (1-credit-hour lab/field experience courses are excepted). Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of D- or higher.

Students who graduate with a major in the natural sciences (biochemistry, chemistry, ecology and evolutionary biology, geology, integrative physiology, molecular, cellular and developmental biology, or physics) or students who graduate with a minor in ecology and evolutionary biology are exempt from completing the natural science requirement.

Courses offered at CU-Boulder that satisfy this requirement include the following:

### Two-semester Sequences

(Note: Although not recommended, the first semester of a sequence may be taken as a single course. Also, some sequences have included, corequisite, or optional laboratories.)

- \*ANTH 2010-3 and \*2020-3 Introduction to Physical Anthropology 1 and 2 (optional labs \*ANTH 2030, \*2040)
- \*ANTH 2050-4 and \*2060-4 Honors: Human Origins 1 and 2 (optional labs \*ANTH 2030, \*2040)
- ASTR 1010-4 and 1020-3 Introductory Astronomy 1 and 2 (lab included in ASTR 1010)
- ASTR 1030-4 and 1040-4 Accelerated Introductory Astronomy 1 and 2 (lab included in ASTR 1030)
- ASTR 1110-3 and 1020-3 General Astronomy: The Solar System and Introductory Astronomy 2
- \*ATOC 1050-3 and 1060-3 Weather and Atmosphere and Our Changing Environment: El Niño, Ozone, and Climate (optional lab ATOC 1070)
- \*CHEM 1011-3 and 1031-4 Environmental Chemistry 1 and 2 (lab included in CHEM 1031)
- \*CHEM 1111-5 and \*1131-5 General Chemistry 1 and 2 (lab included)
- \*CHEM 1113-4 and \*1133-4 General Chemistry 1 and 2 (corequisite labs CHEM 1114 and 1134)
- CHEM 1251-5 and 1271-5 General Chemistry 1 and 2 for Chemistry and Biochemistry Majors (lab included)
- CHEM 1351-5 and 1371-5 Honors General Chemistry 1 and 2 (lab included) (formerly CHEM 1151 and 1171)
- EBIO 1030-3 and 1040-3 Biology: A Human Approach 1 and 2 (optional lab EBIO 1050)
- \*EBIO 1210-3 and \*1220-3 General Biology 1 and 2 (optional labs \*EBIO 1230, \*1240)
- \*GEOG 1001-4 and \*1011-4 Environmental Systems 1 and 2: Climate and Vegetation, Landscapes and Water (lab included)
- \*GEOL 1010-3 and \*1020-3 Introduction to Geology and Introduction to Earth History (optional lab \*GEOL 1030)
- \*GEOL 1010-3 and 1040-3 Introduction to Geology and Geology of Colorado (optional lab \*GEOL 1030)
- \*GEOL 1010-3 and 1060-3 Introduction to Geology and Global Change: an Earth Science Perspective (optional lab \*GEOL 1030)
- MCDB 1111-4 and 2150-3 Biofundamentals: The Evolutionary, Molecular, and Cellular Basis of Life and Principles of Genetics (lab included in MCDB 1111)
- \*MCDB 1150-3 and \*2150-3 Introduction to Cell and Molecular Biology and Principles of Genetics (optional labs MCDB \*1151 and \*2151)
- \*PHYS 1010-3 and 1020-4 Physics of Everyday Life 1 and 2 (lab included in PHYS 1020)
- \*PHYS 1110-4 and \*1120-4 General Physics 1 and 2 (optional lab \*PHYS 1140)
- PHYS 1170-4 and 1180-4 Honors General Physics 1 and 2 (optional lab \*PHYS 1140)
- \*PHYS 2010-5 and \*2020-5 General Physics 1 and 2 (lab included)

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

### Nonsequence Courses

- ANTH 3000-3 Primate Behavior
- ANTH 3010-3 The Human Animal
- ARSC/GEOL 2110-4 Physical Science of the Earth System (lab included)
- ASTR 1120-3 General Astronomy: Stars and Galaxies
- ASTR 2000-3 Ancient Astronomies of the World
- ASTR 2010-3 Modern Cosmology: Origin and Structure of the Universe
- ASTR 2020-3 Introduction to Space Astronomy
- ASTR 2030-3 Black Holes
- ATOC/GEOL 3070-3 Introduction to Oceanography
- ATOC 3180-3 Aviation Meteorology
- ATOC 3300/GEOG 3301-3 Analysis of Climate and Weather Observations
- ATOC 3500-3 Air Chemistry and Pollution
- ATOC/ENVS 3600/GEOG 3601-3 Principles of Climate
- ATOC 4750-3 Desert Meteorology and Climate
- \*CHEM 1021-4 Introductory Chemistry (lab included)
- CHEN 1000-3 Creative Technology
- \*CLAS 2020-3 Science in the Ancient World
- EBIO 3180-3 Global Ecology
- EBIO 3190-3 Tropical Marine Ecology
- ENVS 1000-4 Introduction to Environmental Studies
- ENVS/PHYS 3070-3 Energy and the Environment
- ENVS/GEOL 3520-3 Environmental Issues in Geosciences
- GEOG 3511-4 Introduction to Hydrology
- GEOG/GEOL 4241-4 Principles of Geomorphology (lab included)
- GEOL 2100-3 Environmental Geology
- GEOL 3040-3 Global Change: The Recent Geological Record
- GEOL 3500-3 Earth Resources and the Environment
- GEOL 3720-3 Evolution of Life: The Geological Record
- GEOL 3950-3 Natural Catastrophes and Geologic Hazards
- IPHY 3420-3 Nutrition, Health, and Performance
- IPHY 3660-3 The Dynamics of Motor Learning
- IPHY 3730-3 Brain and Behavior
- \*MCDB 1030-3 Plagues, People, and Microorganisms
- \*MCDB 1041-3 Fundamentals of Human Genetics
- MCDB 3150-3 Biology of the Cancer Cell
- MCDB 3330-3 Evolution and Creationism
- PHIL 1400-3 Philosophy and the Sciences
- PHIL 3410-3 History of Science: Ancients to Newton
- PHIL 3430-3 History of Science: Newton to Einstein
- PHYS 1230-3 Light and Color for Non-Scientists
- \*PHYS 1240-3 Sound and Music
- PHYS 1300-3 Experiment in Physics
- \*PSYC 2012-3 Biological Psychology 1
- SLHS 2010-3 Science of Human Communication

### One-credit-hour Lab/Field Courses

(NOTE: Each course below has a prerequisite or corequisite.)

- \*ANTH 2030-1 Lab in Physical Anthropology 1
- \*ANTH 2040-1 Lab in Physical Anthropology 2
- \*ATOC 1070-1 Weather and the Atmosphere Laboratory
- CHEM 1114-1 Lab in General Chemistry 1
- CHEM 1134-1 Lab in General Chemistry 2
- EBIO 1050-1 Biology: A Human Approach Laboratory
- EBIO 1230-1 General Biology Lab 1
- EBIO 1240-1 General Biology Lab 2
- \*GEOL 1030-1 Introduction to Geology Lab 1
- \*MCDB 1151-1 Introduction to Cell and Molecular Biology Lab
- \*MCDB 2151-1 Principles of Genetics Lab
- \*PHYS 1140-1 Experimental Physics 1

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*



**9. Contemporary Societies (3 semester hours).** All individuals function within social frameworks. Courses in contemporary societies introduce students to the study of social groups, including social institutions and processes, the values and beliefs shared by their members, and the forces that mold and shape social groups. They prepare students to approach social phenomena of all kinds in an informed and critical way, and to describe, analyze, compare, and contrast them. Such study also provides students with new vantage points from which to view their own socio-cultural assumptions and traditions.

These courses, which treat contemporary societies, study an individual society or compare several societies. All explicitly attempt to deepen the students' understanding of the cultural, political, economic, or social contexts that shape people's lives. Their scope may be global or specific, but all courses that fulfill this requirement address social processes, institutions, values, forces, and beliefs.

Students who graduate with a major in anthropology, economics, international affairs, political science, psychology, or sociology are exempt from the contemporary societies requirement. Students may satisfy this 3-hour requirement by passing any course listed below. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of *D-* or higher.

ANTH 1200-3 Culture and Power  
 ANTH 4560/ETHN 4563-3 North American Indian Acculturation (formerly AIST 4565/ANTH 4560)  
 BAKR 1600-3 Creating a Sustainable Future  
 COMM 1210-3 Perspectives on Human Communication  
 \*COMM 2400-3 Communication and Society  
 ECON 1000-4 Introduction to Economics  
 ECON 2010-4 Principles of Microeconomics  
 ECON 2020-4 Principles of Macroeconomics  
 ECON 3403-3 International Economics and Policy  
 ECON 3535-3 Natural Resource Economics  
 ECON 3545-3 Environmental Economics  
 EDUC 3013 (3-4) School and Society  
 ETHN 1025-3 Introduction to Asian American Studies (formerly AAST 1015)  
 ETHN 2232-3 Contemporary Black Protest Movements (formerly BLST 2200)  
 ETHN 2242-3 Black Social and Political Thought (formerly BLST 2210)  
 ETHN 3012/PSCI 3101-3 Black Politics (formerly BLST/PSCI 3101)  
 ETHN 3015-3 Asian Pacific American Communities (formerly AAST 3013)  
 \*FARR/LDSP 2400-3 Understanding Privilege and Oppression in Contemporary Society  
 GEOG 3742-3 Place, Power, and Contemporary Culture  
 GRMN 1601-3 Germany Today  
 HIST 2126-3 Modern U.S. Politics and Diplomacy  
 HIST 2166-3 The Vietnam Wars  
 HUMN 4835-3 Literature and Social Violence  
 \*IAFS 1000-4 Global Issues and International Affairs  
 INVS 3000 (3-4) Innovative Approaches to Contemporary Issues through Service Learning  
 INVS 3304-3 Human Rights: Promotion and Protection, an NGO Perspective  
 INVS 4302/PSCI 4732-3 Critical Thinking in Development  
 \*ITAL 1500-3 "That's Amore": Introduction to Italian Culture  
 ITAL 4290-3 Italian Culture through Cinema  
 LING 1000-3 Language in U.S. Society  
 \*PRLC 1820-3 Community Issues in Leadership  
 \*PSCI 1101-3 American Political System  
 \*PSCI 2012-3 Introduction to Comparative Politics  
 \*PSCI 2223-3 Introduction to International Relations  
 PSCI 3032-3 Latin American Political Systems  
 PSCI 3082-3 Political Systems of Sub-Saharan Africa  
 PSCI 3143-3 Problems in International Relations  
 PSCI 4002-3 Western European Politics  
 PSCI 4012-3 Global Development

PSCI 4062-3 Emerging Democracies of Central and East Europe  
 PSCI 4272-3 Capitalist Democracies in Global World Economy  
 \*PSYC 2606-3 Social Psychology  
 RLST 2400-3 Religion and Contemporary Society  
 RUSS 2221-3 Introduction to Modern Russian Culture  
 RUSS2501-3 Russia Today  
 RUSS 4831-3 Contemporary Russian Literature  
 SCAN 2201-3 Introduction to Modern Scandinavian Culture and Society  
 SCAN 3201-3 Contemporary Nordic Society and Culture  
 SLHS 1010-3 Disabilities in Contemporary American Society  
 \*SOCY 1001-3 Introduction to Sociology  
 SOCY 4024-3 Juvenile Delinquency  
 \*WMST 2600-3 Gender, Race, and Class in a Global Context

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

**10. Ideals and Values (3 semester hours).** Ideals and values have usually been determined by long-standing traditions and fixed social practices. In our modern world, the interaction of different cultures, movement from place to place, electronic media, and the rapidity of change, even within a given society, have combined to generate new constellations of ideals and hard choices among values.

Courses meeting the ideals and values requirement inquire into some specific sphere of human value (e.g. moral, religious, intellectual, aesthetic, environmental, etc.). In these courses students are encouraged to reflect upon fundamental ideals and values, their own and others, and the sources from which those value orientations derive. Such inquiry demands the development of the critical skills which help students identifying the assumptions and ramifications of value structures. It also requires consideration of approaches by which value systems are constructed, justified, and applied, especially in regard to the personal, societal, and in some cases cross-cultural contexts.

Students may complete this 3-hour requirement by passing any course listed below. Students who take approved CU-Boulder course work to fulfill this requirement must take the course for a letter grade and receive a passing grade of *D-* or higher.

ARSC/NRLN 2000-3 Constructions of Knowledge in the Academy and Beyond  
 CLAS/PHIL 2610-3 Paganism to Christianity  
 CWCV 2000-3 The Western Tradition  
 ENVS/PHIL 3140-3 Environmental Ethics  
 \*ETHN 2703/RLST 2700-3 American Indian Religious Traditions (formerly AIST/RLST 2700)  
 FARR 2510/FILM 2613-3 Exploring Good and Evil Through Film (formerly FARR/FILM 2510)  
 FARR 2660/HONR 2250-3 The Ethics of Ambition  
 FARR 2820-3 The Future of Spaceship Earth  
 FILM 2013-3 Film and the Quest for Truth  
 FREN 4860-3 War, Trauma, and Memory (formerly FREN 4000)  
 GRMN/HUMN 1701-3 Nature and Environment in German Literature and Thought  
 GRMN/JWST 2502-3 Representing the Holocaust  
 GRMN 2603-3 Moral Dilemmas in Philosophy and Literature  
 GRMN/HUMN 3505-3 The Enlightenment: Tolerance and Emancipation  
 GRMN/HUMN 4502-3 Nietzsche: Literature and Values  
 HUMN 3590-3 Modern Literature and the Bible: A Case Study in Intertextuality  
 HUMN 4155-3 Philosophy, Art, and the Sublime  
 \*INVS 1000-4 Responding to Social and Environmental Problems through Service Learning  
 JWST/\*RLST 2600-3 Judaism, Christianity, and Islam  
 LDSP 1000-3 The Foundations of 21st Century Leadership  
 LIBB 1500-3 The Dialogue of Art and Religion  
 \*PHIL 1000-3 Introduction to Philosophy  
 \*PHIL 1100-3 Ethics

\*PHIL 1200-3 Philosophy and Society  
 \*PHIL 1600-3 Philosophy and Religion  
 PHIL 2200-3 Major Social Theories  
 PHIL 3100-3 Ethical Theory  
 PHIL/WMST 3110-3 Feminist Practical Ethics  
 PHIL 3160-3 Bioethics  
 PHIL 3190 (3-4) War and Morality  
 PHIL 3200-3 Social and Political Philosophy  
 PHIL 3260-3 Philosophy and the International Order  
 PHIL 3600-3 Philosophy of Religion  
 PRLC 1810-3 Ethical Leadership  
 \*PSCI 2004-3 Survey of Western Political Thought  
 PSCI 3054-3 American Political Thought  
 PSCI 3064-3 Environmental Political Theory  
 RLST 1620-3 The Religious Dimension in Human Experience  
 RLST 2500-3 Religion in the United States  
 \*RLST 2610-3 Religions of South Asia  
 \*RLST 2620-3 Religions of East Asia  
 RUSS 1502-3 Introduction to Ideals and Values in 20th Century Russia  
 RUSS 3502-3 Ideals and Values in Modern Russia  
 RUSS 3701-3 Slavic Folk Culture: Ideals and Values in the Contemporary World  
 RUSS 4221-3 Cultural Mythologies of Russian Communism  
 SEWL 2000-3 America, the Environment, and the Global Economy  
 SLHS 1010-3 Disabilities in Contemporary American Society  
 \*SOCY 1004-3 Deviance in U.S. Society  
 SOCY 1022-3 Ethics and Social Issues in U.S. Health and Medicine  
 \*SOCY 2031-3 Social Problems  
 SOCY 2077-3 Environment and Society  
 SOCY 3151-3 Self in Modern Society  
 SOCY 4121-3 Sociology of Religion

*\*NOTE: This course is approved for the Colorado statewide guaranteed transfer program. Further information about the statewide guaranteed transfer program can be found at the website of the Colorado Commission on Higher Education, [higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html](http://higher.ed.colorado.gov/Academics/Transfers/gtPathways/curriculum.html).*

## Majors and Other Areas of Interest

To be eligible for the four-year guarantee, a student must begin the program of study and declare the major by the start of the second semester or earlier for some select majors. For complete information, see the Four-Year Graduation Requirements in this section.

All arts and sciences students pursuing a bachelor's degree must enter a degree-granting major by the end of their sophomore year (i.e., the semester in which they will complete 60 semester hours of work, including transfer work).

Department academic advisors are responsible for advising their majors and also for certifying the completion of those students' programs for graduation. The college can assume no responsibility for difficulties arising out of a student's failure to establish and maintain contact with the major department or program advisor.

### Minimum Major Requirements

The following minimum requirements are specified by the college. In many cases departmental requirements may be higher than the minimums listed here.

1. A minimum of 30 credit hours in the major area (for the BFA, a minimum of 50 hours).
2. Thirty semester hours in the major area, all with grades of C- (1.700) or higher (no *pass/fail* credits can be applied to the major).
3. Eighteen credit hours of upper-division courses in the major, all with grades of C- (1.700) or higher.
4. Twelve hours of upper-division course work in the major on the CU-Boulder campus.

5. A 2.000 (C) overall grade point average in all major work attempted.
6. Special requirements as stipulated by the major department.
7. No more than 8 credit hours of independent study.

Students are subject to those major requirements in effect at the time they formally declare the major. All College of Arts and Sciences students have 10 years to complete the requirements for a declared major. If this 10-year limit is exceeded, students may be required to satisfy the current major requirements. Students with further questions should consult a major advisor.

### Open Option

"Open option" (OPNO) is a major, but it is not a degree program. Open option offers a structured advising program that provides students with the necessary support and strategies to investigate and compare academic disciplines so they can make informed decisions about the degree programs they will pursue. Students can explore any major available in the college while completing course requirements toward a baccalaureate degree. To ensure that students graduate in a timely manner, open option majors are required to enter a specific degree program by the time they have completed 60 credit hours (approximately the end of the sophomore year). Students must declare and enter a degree-granting major by the start of the second semester (or earlier for certain majors) to maintain eligibility for the four-year guarantee.

Every open option student is assigned to a specific open option advisor with whom the student works until she or he declares and enters a degree-granting major.

### Double Majors

Students pursuing either the BA or BFA degree may graduate with more than one major within the degree (e.g., economics and French) by completing all requirements for both majors. A minimum of 120 total credit hours is required for double majors.

### Minors

A number of departments and programs in the College of Arts and Sciences offer minor programs. Participation in a minor program is optional for students pursuing a bachelor's degree. Course work applied to a minor also may be applied toward general education (core curriculum or college list) and major requirements. Students may not earn a major and a minor in the same program of study. All requirements for the minor must be completed by the time the BA or BFA is conferred.

Departments and programs with approved minor programs currently include applied mathematics; astrophysical and planetary sciences; atmospheric and oceanic sciences; chemistry and biochemistry; Chinese; classics; dance; ecology and evolutionary biology; economics; ethnic studies; French; geography; geological sciences; Germanic studies; history; Italian; Japanese; linguistics; mathematics; Nordic studies; philosophy; physics; political science; religious studies; Russian studies; theatre; and women's studies. Minors are also available in business offered by the Leeds School of Business and in computer science offered by the College of Engineering and Applied Science. Interested students can find further information at [www.colorado.edu/arts\\_sciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/arts_sciences/students/undergraduate/academics/minors.html).

Although the structure of specific minor programs may differ, all minors offered in the College of Arts of Sciences must have the following restrictions or minimum requirements:

1. A minimum of 18 credit hours must be taken in the minor area, including a minimum of 9 upper-division hours.
2. All course work applied to the minor must be completed with a grade of C- or better (no *pass/fail* work may be applied). The grade point average for all minor degree course work must be equal to 2.000 (C) or higher.
3. Students pursuing a major in distributed studies or an individually structured major are not eligible to earn a minor.
4. Students are allowed to apply no more than 9 credit hours, including 6 upper-division credit hours, of transfer work toward a minor.
5. Students may earn no more than two minors.
6. Students must complete all requirements for a minor by the time they graduate.

### Areas of Interest

The college sponsors programs—but not undergraduate majors—in the areas of interest below. Course work in these areas is open to all interested students. Contact the Office of the Dean for more information.

African American Studies  
 American Indian Studies  
 Asian American Studies  
 Bibliography  
 Chicano Studies  
 Honors  
 International and National Voluntary Service Training  
 Museum

### Certificate Programs

The college also sponsors undergraduate certificate programs in a number of fields of study. Completion of specified course work in the certificate programs below entitles students to a certificate issued by the dean of the college. Students interested in these programs should contact the director of the appropriate program.

Actuarial Studies and Quantitative Finance  
 British and Irish Studies  
 Central and Eastern European Studies  
 Cognitive Sciences  
 Foundations of Western Civilization  
 International Media  
 Jewish Studies  
 Lesbian, Gay, Bisexual, and Transgender Studies  
 Medieval and Early Modern Studies  
 Neurosciences and Behavior  
 Peace and Conflict Studies  
 Western American Studies

### Multiple Degrees

#### Double Degrees

Two different degrees (i.e., a BA and BFA from the College of Arts and Sciences, or two degrees from different schools or colleges) may be earned from CU-Boulder if the following conditions are fulfilled:

1. The student meets the residency requirements of, and is enrolled in, both the College of Arts and Sciences and the college or school granting the second degree.
2. The student presents a total of at least 145 credit hours passed. If the second college sets a higher number of minimum credits for a double degree, then the higher minimum must be met.

3. For the BA and BFA degrees, 90 credit hours of arts and sciences course work are required (courses from outside arts and sciences that have been approved for the arts and sciences core curriculum will apply toward the 90 credit hours).
4. The student has completed all general education and major requirements of the College of Arts and Sciences.
5. Both degrees must be awarded at the same time.

### Second Baccalaureate Degrees

A student who has been awarded a baccalaureate degree, either from this college or elsewhere, may be granted a second baccalaureate degree provided the following conditions have been fulfilled:

1. All general requirements for the degree to be awarded by the College of Arts and Sciences have been met. (Students are subject to the general degree requirements in effect the semester they enter the second baccalaureate degree program.)
2. The major in the BA or BFA is different from the major in the first degree earned.
3. Arts and sciences students must complete a minimum of 45 credit hours in University of Colorado courses on the Boulder campus toward the second degree after admission to the second degree program. Of these 45 credits, a minimum of 30 credits must be in arts and sciences upper-division credit hours completed as a matriculated student in the second degree in the College of Arts and Sciences at the University of Colorado at Boulder and at least 12 of these upper-division hours must be in the major. Courses taken as a nondegree student do not count in these minimum requirements.

### Graduation Deadlines

Arts and sciences seniors must meet appropriate application deadlines in order to graduate. To apply for graduation, students must consult with their primary advisor and complete a graduation packet. Students must submit the complete graduation packet to the main office of the Academic Advising Center by one of the deadlines listed below.

Dates are subject to change. Students should verify current deadlines on the Academic Advising Center website ([www.colorado.edu/artssciences/aacforstudents](http://www.colorado.edu/artssciences/aacforstudents)).

Students who intend to complete their degree in August and who want their names to appear in the May commencement program should request that their degree be conferred in August, but must submit their August graduation application by the deadline for May commencement.

Students who apply to graduate but who fail to fulfill all degree requirements by the deadline for that term/year must submit a written request to the college to change their graduation date to a future term/year in order for the college to confer the degree once all remaining requirements are completed. Directions for submitting a request to change graduation dates appear on the Academic Advising Center website ([www.colorado.edu/artssciences/aacforstudents](http://www.colorado.edu/artssciences/aacforstudents)).

Commencement	Date Due
May	November 1
August	March 1
December	May 1

In order for arts and sciences students to be certified as having completed all degree requirements, all credits and grades (including transfer credits and Continuing Education credits

and grades) must be posted to the student records system by the college deadline. The deadline varies from term to term. Visit the Academic Advising Center website for specific dates.

## Graduate Study

Curricula leading to advanced degrees are offered by most of the departments in the College of Arts and Sciences. Students should consult the Graduate School section for admission and degree requirements of the Graduate School. Curricula for graduate programs are listed alphabetically in this section.

For information about enrollment in graduate course work while still an undergraduate, see Seniors at the University of Colorado in the Graduate School section.

## Actuarial Studies and Quantitative Finance Certificate Program

The Actuarial Studies and Quantitative Finance Certificate Program is an interdisciplinary program provided by the Departments of Mathematics, Applied Mathematics, and Economics; and the Leeds School of Business. The program trains students in two tracks. The Actuarial track prepares students for the actuarial profession while the Quantitative Finance track trains students for financial and economics analyst positions. The admission policies and contact information are given for each track.

The **Actuarial Studies Certificate Program** offered by the College of Arts and Sciences is designed to help students obtain the expertise in mathematics, economics, and finance necessary to become actuaries—the mathematical planners of the insurance and pension industries.

Students in the program can be of any major or college, or can be nondegree candidates. The entrance requirements are three semesters of calculus completed with grades of B+ or better. There are a number of courses in mathematics, economics, and business required to earn the certificate. The certificate is awarded by the dean of the College of Arts and Sciences.

Besides taking courses, students are encouraged to take the professional exams offered by the various actuarial societies. The entrance requirements can be waived for students who receive a score of eight out of 10 on the first actuarial examination.

Interested students should contact one of the co-directors, Kent Goodrich at 303-492-6687, Karl Gustafson at 303-492-7752, or Anne Dougherty at 303-492-4011, who will also provide advice on actuarial studies to students who are not in the program. For more information, see [www.colorado.edu/asqf](http://www.colorado.edu/asqf).

The **Quantitative Finance Certificate Program**, offered jointly by the College of Arts and Sciences and the Leeds School of Business, was initiated in the fall of 2004 and is designed to prepare students for financial and economics analyst positions that require outstanding quantitative skills. Often employers hire graduate students for such positions due to a shortage of undergraduates with the required combination of skills and training. This program is designed to meet this need.

The required curriculum is extensive and rigorous. Potential participants are encouraged to begin work early in their studies, preferably during the first year. Course work draws from the Departments of Mathematics, Applied Mathematics, and Economics; and the Leeds School of Business. Qualified students enrolled in any college are invited to participate. For admittance to the program, a student must earn a grade of B or better in each of Calculus I through III. However, students may be provisionally admitted after completion of Calculus I (MATH 1300

or APPM 1350) with a grade of B or better or through advanced placement. Participants may be given preference when enrolling in certain courses in the Leeds School of Business.

Interested students should contact Gerald Madigan, Leeds School of Business, at [Madigan@colorado.edu](mailto:Madigan@colorado.edu). Additional information can be found at [www.colorado.edu/asqf](http://www.colorado.edu/asqf).

## American Studies

See *Ethnic Studies*.

## Anthropology

*Degrees* ..... BA, MA, PhD

Anthropology is the study of people, both ancient and modern, in their cultural context. The field involves a global look at human cultures from prehistoric times to the present, integrating findings from the social sciences, natural sciences, and humanities. Students of anthropology learn to appreciate the variety of cultures throughout human history and to understand the meaning of human biological and cultural development as well as diversity.

The undergraduate degree in anthropology emphasizes knowledge and awareness of:

- basic methods, concepts, alternative theories and approaches, and modes of explanation appropriate to each of the three main subfields of the discipline (archaeology, biological anthropology, and cultural anthropology);
- basic archaeological techniques, including stratigraphy, dating, and inference of human behavior from archaeological data, as well as human history from its beginning through the emergence of complex societies;
- variation, patterning, and creativity in human communities and symbolic systems, including ecological, social structural, and cultural factors exemplified in a diverse array of the world's societies, including those undergoing change as a result of globalization and the impact of contemporary social and political movements; and
- theories of primate and human evolution and the basic data of the hominid fossil record, as well as biological variation in contemporary human populations.

In addition, students completing the degree in anthropology are expected to acquire the ability and skills to:

- identify trends or patterns in anthropological data from different cultures or periods, identify an appropriate context of explanation or interpretation, and formulate a testable explanation or reasonable interpretation, including the ability to identify data that constitute credible evidence for an explanation or interpretation; and
- identify and define a significant problem or topic in anthropology and analyze and interpret data in a systematic manner.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. (A minimum of 30 credit hours in anthropology, 18 of which must be upper division, is required for the degree.)

<i>Required Courses</i>	<i>Semester Hours</i>
ANTH 2010 Introduction to Physical Anthropology 1 . . . . .	3
ANTH 2100 Frontiers of Cultural Anthropology . . . . .	3
ANTH 2200 Introduction to Archaeology . . . . .	3

One upper-division topical course in cultural anthropology . . . . .	3
One upper-division ethnographic area course in cultural anthropology . . .	3
One upper-division course in archaeology . . . . .	3
One upper-division course in physical anthropology . . . . .	3
Electives in anthropology (6 credits must be at the upper-division level; students planning to pursue graduate work in anthropology are advised to take ANTH 4000 and ANTH 4530) . . . . .	9

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in anthropology, students should meet the following requirements:

- Declare a major in anthropology by the beginning of the second semester.
- Complete ANTH 2010, 2100, and 2200 by the end of the fourth semester.
- Complete 12 credits of upper-division anthropology courses by the end of the sixth semester, including fulfilling at least two of the four upper-division requirements.
- Complete 6 additional anthropology credits by the end of the seventh semester, including the two remaining upper-division requirements.
- Complete one 3-credit anthropology course during the eighth semester.

### Graduate Degree Programs

**Prerequisites.** To be considered for admission as a regular degree student, applicants should have a minimum undergraduate grade point average of 3.00 (4.00 = A) or a master of arts degree in anthropology. Graduate Record Examination scores for verbal and quantitative aptitude tests are required. Letters of recommendation and evidence of previous anthropologically oriented experience and work are carefully considered. Students with fewer than 18 credit hours of previous course work in anthropology are considered deficient and may be asked to present a greater number of hours for a degree.

**Application.** Inquiries concerning applications should be directed to the main departmental office. Completed applications are reviewed once each year and are due by January 15. Students with no previous graduate work should apply for entrance into the MA program which, if successfully completed, will prepare them for the PhD program. Students who have or will have completed an MA degree in anthropology by the time of their admission may apply for direct admission into the PhD program, but they may be required to complete specific remedial requirements in some cases.

**Course Requirements.** Students may have a primary specialization in any of the major subfields of anthropology: archaeology, cultural, or biological anthropology. The department expects graduate students to maintain a breadth of competence in general anthropology through the master’s degree with specialization intensifying with progress toward the PhD degree.

All entering graduate students must have had the equivalent of ANTH 4000 or 5000 (Quantitative Methods in Anthropology) or take the course, or in the case of cultural anthropology students an appropriate “tool course,” during their first year in residence.

As partial fulfillment towards a graduate degree, all students must complete three designated graduate core courses, one from each of the three subdisciplines of anthropology (cultural, biological, and archaeology). Core courses should be taken during the first two semesters in residence, if possible. Other specific course requirements are established through a consultation with an academic advisor. MA students in archaeology and biological anthropology are normally expected to write a thesis (plan

I). In consultation with their advisor, students in cultural anthropology have the option of writing a thesis or completing their MA degree by examination only (plan II).

Additional information about other specific areas of specialization and other requirements for the degree may be obtained by writing directly to the Department of Anthropology, and by referencing the Graduate School section. Information is also available at the departmental website ([www.colorado.edu/anthropology](http://www.colorado.edu/anthropology)).

### Applied Mathematics

*Degrees*.....MS, PhD

The Department of Applied Mathematics in the College of Arts and Sciences offers courses and degree programs for undergraduate and graduate students. Course offerings at the undergraduate level focus on providing students with the mathematical tools and problem-solving strategies that are useful in science and engineering. The undergraduate bachelor of science degree is offered through the College of Engineering and Applied Science.

The department offers a range of courses and research opportunities in many areas, including computational mathematics, mathematical biology, nonlinear phenomena, physical applied mathematics, and probability and statistics. Each of these areas is described below.

#### Computational Mathematics

The study of computational mathematics has grown rapidly in recent years and has allowed mathematicians to answer questions and to develop insights not possible just a decade or two ago. Modern computational methods require in-depth knowledge of a variety of mathematical subjects including linear algebra, analysis, ordinary and partial differential equations, asymptotic analysis, elements of harmonic analysis, and nonlinear equations. Since computers are invaluable tools for an applied mathematician, students are expected to attain a highly professional level of computer literacy and to gain a substantial knowledge of operating systems and hardware. Computational mathematics courses include the study of computational linear algebra, optimization, numerical solution of ordinary and partial differential equations, solution of nonlinear equations, and advanced seminars in wavelet and multiresolution analysis and in multigrid methods, radial basis functions, and algorithm design and development, more generally.

#### Mathematical Biology

Recent advances in our ability to quantitatively study biological phenomena have provided a tremendous number of exciting opportunities for applied mathematicians. The careful modeling, analysis, and simulation of these systems using the standard and state-of-the-art tools of applied mathematics has led to novel and non-intuitive insights into biology. Furthermore, deeper understanding of the inherently complex and multiscale nature of biological systems, in many cases, requires the development of new mathematical tools, techniques, and methodologies (a challenge to which applied mathematics is particularly well suited). For students interested in pursuing research in mathematical biology, good preparatory classes would include differential equations, advanced calculus, numerical analysis, and probability and statistics, as well as supplemental courses in the appropriate biological, biomedical, or bioengineering fields. Research areas at CU encompass immunology, virology, bacteriology, population genetics, and cardiac nonlinear dynamics. Specifically, current topics of interest include model selection and control of in vivo

HIV pathogenesis dynamics, modeling of intracellular calcium dynamics, the analysis of heart rhythm instabilities, the role of aggregation and fragmentation in bacteremia and bacterial pneumonia, inverse problems arising in the use of population genetics and bioinformatics to identify geographic features, and the analysis of patterns in biological sequences such as DNA and RNA.

### *Nonlinear Phenomena*

In recent years, there has been an explosion of interest in the study of nonlinear waves and dynamical systems with analytical results, often motivated by the use of computers. The faculty in the Department of Applied Mathematics are actively and intensively involved in this growing field. Research areas include qualitative analysis and computational dynamics, conservative and dissipative systems, bifurcation theory, the onset and development of chaos, wavelets and multiresolution analysis, integrable systems, solitons, cellular automata, analytic dynamics, pattern formation and symmetry, synchronization, dynamics on networks, fluid dynamics, and transport and mixing. Department courses in this field include dynamical systems, nonlinear wave motion, and many advanced seminars. Suitable background courses are analysis, computation, and methods in applied mathematics. Valuable supplemental courses include mechanics and fluid dynamics.

### *Physical Applied Mathematics*

Physical applied mathematics is a term that generally refers to the study of mathematical problems with direct physical application. This area of research is intrinsically interdisciplinary. In addition to mathematical analysis, it requires an in-depth understanding of the underlying applications area, and usually requires knowledge and experience in numerical computation. The department has approximately 40 affiliated faculty who can direct thesis research in areas such as atmospheric and fluid dynamics, theoretical physics, plasma physics, genetic structure, parallel computation, etc. The department's course requirements are designed to provide students with a foundation for their study (analysis and computation). The department also requires supplemental courses in one of the sciences or engineering fields necessary for thesis research in physical applied mathematics.

### *Probability and Statistics*

Almost all natural phenomena in the technological, biological, physical, and social sciences have random components with complex levels of interactions, part stochastic, part deterministic. Applied probability is the application of probabilistic and analytic methods to model, understand, and predict the behavior of real-life problems that involve random elements. Statistics is the science of using data that typically arise from the randomness inherent in nature to gain new knowledge. Areas of current interest by applied math and their affiliated faculty include optimization of stochastic networks; the study of stochastic processes, and stochastic differential equations in hydrology and telecommunications; probabilistic models, nonparametric regression methods, shrinkage estimation, gene expression microarray data analysis, false discovery rate control, classification methods, and statistical tests based on these models, in genetics and RNA sequencing; and extreme value theory in estimation of maximal wind speeds. Appropriate course work includes analysis, stochastic processes, simulation techniques, mathematical statistics, as well as background courses in one of the sciences or engineering fields in which one intends to do research.

For details on the range of courses and research opportunities available through the Department of Applied Mathematics, visit [amath.colorado.edu](http://amath.colorado.edu).

## Bachelor's Degree Programs

A bachelor of science degree in applied mathematics is offered by the College of Engineering and Applied Science.

The undergraduate curriculum in applied mathematics trains students in the applications of mathematics in engineering and science. The use of computational methods and implementation of algorithms on computers is central. Technical electives may be selected from mathematics, engineering, physics, chemistry, computer science, biology, astrophysics, geology, economics, finance, and accounting.

In general, nontechnical electives should be broadening and have multicultural value. Students interested in research also are encouraged to take a foreign language as early as possible. French, German, or Russian are recommended.

Interested students should contact the applied mathematics office in the College of Arts and Sciences for information on specific major and degree requirements.

### *Minor Program*

A minor is offered in applied mathematics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

A minor in applied mathematics indicates that a student has received in-depth training in mathematical techniques and computational methods well beyond the training usually received by science and engineering majors.

## Concurrent BS/MS Degree Program

The concurrent BS/MS program in applied mathematics enables well-qualified and motivated students to experience graduate-level course work earlier in their education and to obtain an MS degree in a reduced time period. Applied math majors may apply for this program during their junior year. Minimum requirements for admission include completion of at least two APPM courses numbered 3000 or higher, an overall GPA of 3.400 or higher, an APPM and MATH GPA of 3.400 or higher, and two letters of recommendation from APPM faculty. Students interested in this program are encouraged to consult with an applied mathematics faculty advisor early in their undergraduate career.

## Graduate Studies

Prerequisites for graduate study in applied mathematics include three semesters of calculus and a course in differential equations and linear algebra. Other strongly recommended courses are Methods in Applied Mathematics (APPM 4350 and 4360); Intermediate Numerical Analysis (APPM or MATH 4650 and 4660); either Matrix Methods (APPM 3310) or Linear Algebra (MATH 3130); and Analysis (APPM 4440). The overall grade point average for mathematics and applied mathematics must be B or better.

Students should carefully read the Requirements for Advanced Degrees in the Graduate School section. What follows is an abbreviated summary of specific requirements for the department. A precise description of the degree requirements is available from the *Applied Mathematics Supplement to the Catalog* available from the applied mathematics office or at [amath.colorado.edu](http://amath.colorado.edu).

### MS Degree

The department requires a candidate to complete an approved program of study consisting of at least 30 semester hours. At least 18 of these 30 hours must be in applied mathematics courses at the 5000 level or above (neither 4350/5350, 4360/5360, nor 4720/5720 generally count toward this requirement). All students must complete two yearlong sequences in applied mathematics. (Approved sequences are APPM 5440/5450, 5470/[5430, 5460, or 5480], 5520/[5540 or 5560], and 5600/5610. Other sequences require faculty advisor approval.) If APPM 5600/5610 is not taken, then the numerics preliminary exam becomes compulsory. All students are required to take a year-long sequence in an area where mathematics has significant applications or from the math department (faculty advisor approval required).

The master's degree requirements may be fulfilled by following the requirements for either the thesis (Plan I) or the non-thesis (Plan II) option. Students who elect Plan II must have approval of the chair of the Graduate Committee.

### Combined MS and MA Program with MCD Biology

This three-year interdisciplinary program offers two master's degrees: an MS in applied mathematics and an MA in MCD biology. The goal of the program is to produce well-trained applied mathematics students who are capable of making serious contributions leading to advancements in molecular biology. Such students will be well educated in computational sciences, statistics, probability, and molecular biology.

Students are expected to meet all requirements for admission to the graduate program in the Department of Applied Mathematics and to possess a basic science background suitable for pursuit of this dual degree. Students also are expected to meet minimum requirements for admission to the graduate program in MCD Biology. Adequate undergraduate preparation consists of successful completion of basic courses on cell and molecular biology. Any student deemed deficient in either area will be required to take Cell Biology (MCDB 3120) and Molecular Biology (MCDB 3500) after enrollment. Students will be required to apply to both programs, with APPM the primary one. Subject to joint recommendation and approval by APPM and MCDB, incoming students will be admitted to this dual degree program as a regular part of the applied mathematics recruitment process.

### MS with Computational Science and Engineering Track

The purpose of this program is to meet the needs of students who want to learn the basic concepts and skills of Computational Science and Engineering, and then to continue toward a PhD in a discipline outside applied mathematics. A student who completes this program successfully will obtain a master's degree in applied mathematics, in the Computational Science and Engineering Track. The program is designed to provide interested students with a foundation in computational mathematics and, at the same time, to allow sufficient latitude for the student to become proficient in an outside discipline. Approximately half of the credits for the master's degree will be taken from a department other than applied mathematics.

A student in the Computational Science and Engineering Track will be enrolled simultaneously in two graduate programs, one in applied mathematics and one in the department from which the student wishes to receive a PhD. An interested student may apply for admission to this track either when applying for graduate study at CU, or at any time in the student's first

two years of graduate study. First-year and second-year graduate students in any of the participating departments may apply for admission to this program.

### PhD Degree

The Department of Applied Mathematics offers course work and research leading to the PhD degree in applied mathematics.

A minimum of 60 credit hours is required for the degree, including 30 hours in courses numbered 5000 or above (4350/5350, 4360/5360 and 4720/5720 generally do not count toward this requirement) and 30 hours of applied math dissertation credit. A grade of B- or higher must be attained in each course. No specific courses are mandatory (apart from two semesters of seminars—APPM 8000, 8100, 8300, and 8600), but the selection ought to include some of the department's core sequences, such as applied analysis (APPM 5440/5450) and numerical analysis (APPM 5600/5610). Other recommended sequences are methods (APPM 5470/[5430, 5460, or 5480]) and statistics (APPM 5520/[5540 or 5560]). Finally, each student must take a yearlong graduate sequence outside of applied mathematics in an area where mathematics has significant application. Faculty advisor approval of the sequence is required. Preliminary exams are offered in four areas: analysis, numerics, partial differential equations, and probability/statistics. Students must take the numerics and analysis exams, and either one of the other two.

Further information on the department and degree requirements is available from the supplement to the catalog in the applied mathematics office or in the Graduate School.

### Art and Art History

*Degrees*..... BA, BFA, MA, MFA

The Department of Art and Art History offers the bachelor of arts in art history and in studio, and the bachelor of fine arts in studio arts.

The undergraduate degree in art history emphasizes knowledge and awareness of:

- the major artistic monuments of the world in a historical context;
- varied methodologies used to study art historically; and
- artistic media and techniques.

In addition, students completing the degree in art history are expected to acquire the ability and skills to:

- relate individual monuments to their historical and cultural context by identifying technique, style, and subject matter;
- interpret historical and critical information about works of art, artists, and related issues; and
- organize and communicate concepts and data pertaining to the history of art effectively in written and oral form.

The undergraduate degree in studio art emphasizes knowledge and awareness of:

- the significance of the major monuments in art history, with an emphasis on contemporary art;
- at least one discipline of studio art;
- related critical issues in studio practice; and
- a wide range of stylistic approaches.

In addition, students completing a degree in studio art are expected to acquire the ability and skills to:

- analyze their own works of art in terms of form and content;

- interpret the work of others;
- execute ideas in one or more artistic media;
- demonstrate artistic ability and technical proficiency in one chosen medium; and
- communicate in verbal and written form the particular conceptual and perceptual attitudes and stances of their own artistic production.

### Bachelor's Degree Programs

The degree requirements for the BA in art history are currently under review. For the most current information go to [www.colorado.edu/finearts/resources/baah.html](http://www.colorado.edu/finearts/resources/baah.html). BA degrees in art history and in studio arts require 39 credits in the major and a minimum of 75 nonmajor credits. The BFA degree in studio arts requires 63 credits in the major. Regular contact with fine arts advisors is recommended.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

#### Bachelor of Arts (Art History)

(39 credit hours in the major)

Required Courses	Semester Hours
ARTS 1010 and 1020 Introduction to Art . . . . .	6
ARTH 1300 and 1400 World Art 1 and 2 . . . . .	6
ARTH 4919 BA Art History Seminar . . . . .	3
3000-level art history courses . . . . .	9
4000-level art history courses . . . . .	9
ARTS or ARTH electives . . . . .	6
Distribution Requirements: Complete at least six hours at the 3000 or 4000 level in each of three areas: Ancient and/or African/American/Asian/Australian, Medieval and/or Early Modern (a.k.a. Renaissance and Baroque), and Modern and/or Contemporary. Students must take at least one course in African, American, Asian, or Australian art at the 3000 or 4000 level.	

#### Graduating in Four Years with a BA in Art History

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in art history, students should meet the following requirements:

Declare the major by the beginning of the second semester.

By the end of the third semester, complete lower-division studio courses, lower-division art history courses, and two classes in upper-division art history.

By the end of the sixth semester complete up to 32 credit hours in the major. Final semesters not to exceed 45 credits toward the major.

#### Bachelor of Arts (Studio Arts)

(39 credit hours in the major)

Required Courses	Semester Hours
ARTS 1010 and 1020 Introduction to Art . . . . .	6
ARTH 1300 and 1400 World Art 1 and 2 . . . . .	6
Two 2000-level courses in area of emphasis . . . . .	6
Any two upper-division art history courses. . . . .	6
Upper-division studio emphasis (minimum) . . . . .	12
ARTS or ARTH electives . . . . .	3

#### Graduating in Four Years with a BA in Studio Arts

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain

adequate progress toward a BA in studio arts, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete ARTS 1010 and 1020 Introduction to Art, two level-1 studio classes, and lower-division art history courses by the end of the third semester.

Complete 30–36 credit hours in the major by the end of the sixth semester.

Final semesters not to exceed 45 credits in the major.

#### Bachelor of Fine Arts (Studio Arts)

(63 credits toward the major)

Students must present and pass a portfolio review to be eligible for the BFA degree (a minimum of 30 credit hours is required).

Required Courses	Semester Hours
ARTS 1010 and 1020 Introduction to Art . . . . .	6
ARTH 1300 and 1400 World Art 1 and 2 . . . . .	6
Any two 2000-level studio courses in area of emphasis . . . . .	6
Any two upper-division art history courses. . . . .	6
Upper-division studio emphasis (min.) . . . . .	18
ARTS or ARTH electives . . . . .	18
ARTS 4117 BFA Seminar . . . . .	3

NOTE: BA/BFA candidates must complete 12 upper-division hours in the major on the Boulder campus.

#### Required Studio Courses for Studio Arts Majors

Painting and drawing majors must take any sequence of courses culminating in ARTS 4002 Drawing 4 or ARTS 4202 Painting 4.

Ceramics majors must take ARTS 4085 Ceramics 4 and ARTS 4095 Special Topics in Ceramics.

Printmaking majors are not required to take ARTS 1003 and may register for ARTS 3403, ARTS 3413, and ARTS 3423 as sophomores.

#### Graduating in Four Years with a BFA in Studio Arts

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in studio arts or divisional studio arts, students should meet the following requirements:

Declare the major by the beginning of the first semester, freshman year.

Complete ARTS 1010 and 1020, ARTH 1300 and 1400, 9 credit hours of lower-division studio, two 2000-level courses, and one lower-division or upper-division studio or art history course by the end of the third semester (27 credit hours).

Apply for the BFA in the fourth or fifth semester, with a minimum of 30 hours in the major.

Complete up to 48 credit hours in the major by the end of the sixth semester. Final semesters not to exceed 66 credits toward the major.

#### Honors

Students may graduate with departmental honors. Those interested in pursuing this program should contact the Honors Department and/or the Department of Art and Art History honors representative as early as possible. The minimum GPA requirement is 3.300 overall and 3.500 in the major. Students may take Studio or Art History Honors Thesis to complete individual work.

#### Student Fees

Each course in the department has a course fee calculated at \$50 per course for lecture and seminar courses and \$50 per credit hour for studio courses.

#### Special Programs

**The CU Art Museum.** The CU Art Museum is a cultural gateway to the University of Colorado at Boulder, facilitating engagement with larger societal issues through a greater understanding of the arts in a global context. The CU Art Museum is committed



to enhancing understanding and appreciation of the visual arts within the academic community and among regional, national, and international audiences. It provides access to art of the highest quality through exhibitions, publications, and related educational events that reflect diversity, critical thinking, and creative research. The museum also facilitates student training in museum practices. As a collecting institution, the CU Art Museum promotes the excellence, preservation, scholarly interpretation, exhibition, and growth of its comprehensive permanent collection, which includes artworks from numerous time periods, artistic traditions, and cultures. The new 25,000-square-foot CU Art Museum contains five galleries including permanent collection galleries, changing exhibition galleries, and a video gallery. The CU Art Museum also includes a collections study center, allowing students, faculty, and researchers the opportunity to schedule appointments to view, research, and study works in its permanent collection.

**The CU Art Museum's Permanent Collection.** The Permanent Collection of the CU Art Museum contains over 6,000 works of art. The collection includes works from numerous time periods and cultures including ancient Greek pottery, Roman Glass, ancient Iranian pottery, Southwestern and South American santos, Southeast Asian pottery, African sculpture, Old Master works on paper, British 18th century prints, 19th and 20th century American prints and paintings, Japanese *ukiyo-e* prints, 19th century photography, Pop art, Minimalist works on paper, and modern and contemporary ceramics, sculpture, works on paper, paintings, photography, video, and new media art.

**Visiting Scholar Program.** This program is organized to explore the discipline of art history—its cultural connections, methodological pursuits, and its changing nature—by focusing extensively on the research and insights of individual academic experts. Three to five highly regarded art historians and/or art critics speak at a public lecture, presenting current research and published papers. During their week-long visit they work closely with students enrolled in the Visiting Scholar Seminar.

**Visiting Artist Program.** Artists of national and international reputation interact with graduate and advanced undergraduate students and discuss their studio work at seminar meetings. Artists present a public lecture during their visit, providing continuous input of significant developments and a comprehensive view of contemporary issues in the arts.

**Visual Resources Center (VRC).** The mission of the VRC is to provide and facilitate access to images, imaging, and related information resources for teaching and research in the Department of Art and Art History. This includes: 1) a departmental image collection and support for other important image resources; 2) resources, training, and support in digital imaging and image presentation software; and 3) equipment for use in creative work, documentation, and classrooms within the department. The digital image collection contains works by faculty, MFA thesis recipients, visiting artists, and other contemporary and historical works. Digital imaging resources include slide and flatbed scanning stations, with training available in digitization standards and best practices. VRC equipment includes laptops, data projectors, digital SLR cameras, video cameras, tripods, and other equipment for use in the department. The VRC also circulates its collection of DVDs containing lectures and interviews from the department's Visiting Artist Program. More information is available at [www.colorado.edu/finearts/vrc/vrc.html](http://www.colorado.edu/finearts/vrc/vrc.html).

## Graduate Degree Programs

The master of arts degree is offered in art history, and the master of fine arts degree is offered in creative arts. It is expected that the program be completed within two years for the MA degree and two-and-a-half years for the MFA degree. The creative arts areas include ceramics, painting and drawing, media arts (photography, video, and digital arts), film (in collaboration with the Film Studies Program), printmaking, sculpture, and Integrated Arts (IA). Students are encouraged to consult with an advisor in the appropriate area in order to obtain advice and current information.

The department, in conjunction with the Leeds School of Business, offers a dual degree program in which both MBA and MFA (or MA) degrees are awarded. The requirements are as follows:

Students must apply to and meet application requirements for each program separately.

Students must meet the admission standards for each program separately; Dual degree students may start either program first; in the first year of studies, courses are taken in one of the two departments exclusively; in the second year, courses are taken in the other department exclusively; in the third year, a combination of MBA and MFA (MA) courses is taken.

### Master of Arts Degree (Art History)

**Prerequisites.** The following are required for admission to the graduate program:

1. A baccalaureate degree from an approved college with a cumulative grade point average of at least 3.000.
2. A score of 500 or higher on the verbal section and an average score (approximately 50 percent below) on all other sections of the Graduate Record Examination.
3. A broad general background in history, literature, and philosophy.
4. An extensive background in art history.
5. Applicants to the master's program in art history are asked to write a 750 to 1,000 word essay in Part II, number 6 on the application form.

**Examinations.** The comprehensive exams are given during the second year of study to measure graduate student knowledge of art history at the master's degree level. The exams consist of essay questions.

**Degree Requirements: Plan I (Thesis Option).** A minimum of 30 semester hours must be completed, of which 21 must be completed in residence on the Boulder campus. Requirements and regulations include:

#### 1. Courses.

Theories of Art History (ARTH 6929) must be taken during the first semester.

This course may be taken twice for up to 6 credit hours.

Visiting Scholars Seminar (ARTH 6939) must be taken during the second semester. Students are encouraged to repeat this course.

At least one 3-credit, 5000- or 6000-level course in four of the following areas of art history: ancient, medieval, early modern and Renaissance, Baroque, Art of the Americas, modern, contemporary, Asian, and critical theory/museology.

Where appropriate, Teaching Practicum, 2 credits per semester while teaching, not to exceed 8 credits.

At least one 3-credit, 3000-level or above course in a department outside the Department of Art and Art History, which supplements the major or minor areas of specialization.

Comprehensive exam.

Master's Thesis (ARTH 6959): 4–6 credit hours (see below).

No more than 9 hours of independent study credit may be applied toward the MA degree.

*Pass/fail* courses do not count toward the MA degree.

A limit of 9 hours of transfer credits may be applied toward the MA degree.

Students are encouraged and expected to attend undergraduate lecture courses as needed to prepare themselves for graduate seminars and for the comprehensive exam.

2. **Thesis.** See thesis requirements under Master of Arts and Master of Science in the Graduate School section.
3. After acceptance of the final draft of the thesis by the thesis advisor, an oral examination takes place dealing with the subject matter of the thesis and any areas of weakness that may have been found in the written comprehensive exam.
4. **Language Requirement.** The candidate for the MA degree in art history is required to demonstrate an adequate reading knowledge of French, German, or another appropriate language before receiving the degree by satisfactory course work equal to 3 progressive semesters at the college level or above or by passing an approved language examination. Language examinations may be arranged with one of the art history faculty on an individual basis.

**Degree Requirements: Plan II (Project Option).** Same requirements as above with the following exceptions:

1. A minimum of 36 semester hours is required.
2. The project replaces the thesis.

**Master of Fine Arts Degree (Creative Arts)**

**Prerequisites.** The following are required for admission to the graduate program:

1. Bachelor's degree from an approved college or school of art with a minimum grade point average of 2.750.
2. Minimum of 34 credit hours of acceptable work in art; 12 credits in fine arts history is preferred.
3. Submission of a portfolio, including 20 images, representing creative work, a written statement of goals and objectives, and an artist statement.
4. Applicants interested in media arts and film should submit a portfolio of creative work to include CDs, DVDs, video and/or audio tapes, film, etc., as appropriate (especially for documentation of performance and/or installations) for screening by the media arts and film committees.

**Degree Requirements.** A minimum of 54 credit hours (of which 36 credit hours must be taken in residence on the Boulder campus) of acceptable graduate work must be completed beyond the bachelor's degree, with the following requirements:

<i>Required Courses</i>	<i>Semester Hours</i>
Home studio (major area) . . . . .	min. 12
Electives (student and non-studio; up to 6 credits may be taken in an allied field, at the 300 level and above) . . . . .	21
Art history and theory . . . . .	9
Visiting Artist Seminar. . . . .	3
Graduate Art Seminar . . . . .	3
Thesis . . . . .	6

**Film Track MFA**

ARTF 5030 Visiting Filmmakers Seminar is allowed as a substitute for ARTS 5118 Visiting Artist Seminar;  
 ARTF Critical Studies courses are allowed as alternates to fulfill 3 credit hours of the art history requirement.

**Graduate First-Year Review**

Graduate students are required to schedule a first-year review at the end of the first year of full-time study. The purpose of this review is to evaluate the student experience in the program and prepare the student for the qualifying paper (art history) or prethesis review (studio arts).

**Transfer of Credit**

Procedures for transferring credit from other graduate programs are governed by the regulations of the Graduate School. Transfer credit, not to exceed 18 semester hours for studio arts or 9 semester hours for art history, must first be approved by faculty in the student major area.

**Change in Area of Concentration**

Students who wish to change their area of concentration after admission must petition the departmental graduate committee.

**Graduation**

Before registering for ARTS 6957 (MFA Thesis), students must have a pre-thesis review with their faculty advisor and thesis committee. Studio arts thesis work must take the form of original creative work of acceptable professional standards. The oral defense exam must be done in conjunction with the thesis exhibition, and the candidate must provide a critical written statement (creative thesis) concerning the work. The candidate's written creative statement is housed with the Art and Architecture Collection in Norlin Library, and 10–15 digital images (representing work in the exhibition) become part of and are housed with the departmental Visual Resources Collection. The committee may request a contribution of original work.

**Asian Languages and Civilizations**

*Chinese or Japanese Degree*.....BA

*East Asian Languages and Literature Degree* ..... MA

Undergraduate students may choose to major in either Chinese or Japanese. In either case they receive a thorough grounding in the modern language, an introduction to the classical language and literature, and a broad familiarity with the literary and cultural history of the selected area.

Before registering for specific courses, students should consult with a departmental advisor concerning appropriate placement in language classes. Also, students interested in Chinese or Japanese are encouraged to broaden their career options through a double major, combining either language with another field of interest. Recent graduates have found positions in such fields as government service, international business, and secondary-school teaching; others have gone on to graduate study in Chinese or Japanese.

**Bachelor's Degree Programs**

**Chinese**

The undergraduate degree in Chinese emphasizes knowledge and awareness of:

- Chinese literary history, focusing on selected canonical or widely recognized works;
- the historical and cultural contexts in which particular works were written;
- critical approaches to the study of Chinese language and civilization; and

- the challenges, deficiencies, and possible gains inherent in the process of translating from one language to another.

In addition, students completing the degree in Chinese are expected to acquire the ability and skills to:

- read modern Chinese at a level at which critical literary analysis can be performed;
- read classical Chinese, with the aid of appropriate reference works, at the level at which the text may begin to be appreciated for its literary value;
- speak and comprehend Mandarin sufficient for all situations in daily life and for a basic level of academic conversation;
- analyze and interpret literary texts in terms of style, structure, character, themes, and use of allusion; and
- communicate such interpretations competently in standard written English.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. CHIN 1010, 1020, and 2110 do not count toward the maximum of 45 credits in the major department.

#### Chinese Language and Literature Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below, including 30 credit hours of courses in Chinese language and literature above CHIN 2110. CHIN 2120 or its equivalent is the prerequisite to upper-division courses required for the major. At least 25 credit hours must be in upper-division courses.

<i>Required Courses</i>	<i>Semester Hours</i>
CHIN 2120 Intermediate Chinese 2 . . . . .	5
CHIN 3110 and 3120 Advanced Chinese 1 and 2 . . . . .	10
CHIN 4210 Introduction to Classical Chinese . . . . .	4
CHIN 4220 Readings in Classical Chinese . . . . .	4
Additional credit hours selected from the following courses:	
CHIN 3311 The Dao and the World in Medieval China . . . . .	3
CHIN 3321 Culture and Literature of Ancient China . . . . .	3
CHIN 3331 Culture and Literature of Late Imperial China . . . . .	3
CHIN 3341 Modern Chinese Literature in Translation . . . . .	3
CHIN 3351 Reality and Dream in Traditional Chinese Fiction . . . . .	3
CHIN 3361 Women and the Supernatural in Chinese Literature . . . . .	3
CHIN 3371 Topics in Chinese Film . . . . .	3
CHIN 3441 Language and Chinese Society . . . . .	3
CHIN 3451 Language and Gender in China . . . . .	3
CHIN 4110 Readings in Modern Chinese 1 . . . . .	3
CHIN 4120 Readings in Modern Chinese 2 . . . . .	3
CHIN 4300 Open Topics . . . . .	3
CHIN 4750 Daoism . . . . .	3
CHIN 4900 Independent Study . . . . .	1-3
CHIN 4950 Honors Thesis . . . . .	3

#### Chinese Language and Civilization Track

Requires successful completion of 30 credit hours, apportioned as follows:

CHIN 2120 Intermediate Chinese 2 . . . . .	5
CHIN 3110 and 3120 Advanced Chinese 1 and 2 or CHIN 4210 and 4220 Introduction to Classical Chinese and Readings in Classical Chinese . . . . .	8-10

The remaining 15 or 17 credits may be chosen from other CHIN or EALC courses, excluding only language courses numbered below 2120. Six of these remaining hours may be satisfied by courses focusing wholly or substantially on China offered in other departments, subject to approval by the undergraduate advisor in Chinese.

Of the 30 credit hours presented for the degree, at least 18 must be at the upper division.

#### Graduating in Four Years with a BA in Chinese

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Chinese, students should meet the following requirements:

Declare the major in the first semester.

Students wishing to major in Chinese and who have no prior knowledge of the language should begin the required major courses no later than the sophomore year.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

#### Minor Program

A minor is offered in Chinese. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

#### Japanese

The undergraduate degree in Japanese emphasizes knowledge and awareness of:

- the outlines of the history of Japanese literature from the Nara period to the present;
- the outlines of Japanese historical and cultural development; and
- appropriate research strategies for Japanese language, literature, and culture.

In addition, students completing the degree in Japanese are expected to acquire the ability and skills to:

- speak and comprehend Japanese sufficiently for daily life;
- read, interpret, and analyze modern written texts;
- compose letters and simple compositions;
- use cultural awareness and understanding to function appropriately in a range of social situations; and
- communicate the results of research in English.

In addition, students target one or more of the following goals:

- read and comprehend classical Japanese, with the aid of appropriate reference works;
- translate a range of Japanese texts into English; and
- understand and analyze the structure of the Japanese language and communication patterns in Japanese.

#### Japanese Language and Literature Track

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. JPNS 1010, 1020, and 2110 do not count towards the maximum of 45 credits in the major department.

<i>Required Courses</i>	<i>Semester Hours</i>
Successful completion of 30 credit hours of courses in Japanese language and literature above JPNS 2110. JPNS 2120 or its equivalent is the prerequisite to upper-division language courses required for the major. At least 25 credit hours must be at the upper-division level.	
JPNS 2120 Intermediate Japanese . . . . .	5

JPNS 3110 and 3120 Advanced Japanese 1 and 2 . . . . .	10
JPNS 4110 and 4120 Readings in Modern Japanese 1 and 2 or JPNS 4210 and 4220 Contemporary Japanese 1 and 2 . . . . .	6
Additional credit hours selected from the following courses including two of the asterisked courses):	
JPNS 3441 Language and Japanese Society . . . . .	3
*JPNS 3811 Classical Japanese Literature in Translation . . . . .	3
*JPNS 3821 Medieval Japanese Literature in Translation . . . . .	3
*JPNS 3831 Early Modern Japanese Literature in Translation. . . . .	3
*JPNS 3841 Modern Japanese Literature in Translation . . . . .	3
JPNS 4030 Japanese Syntax . . . . .	3
JPNS 4070 Second Language Acquisition in Japanese. . . . .	3
JPNS 4080 Kanji in Japanese . . . . .	3
JPNS 4210 and 4220 Contemporary Japanese 1 and 2 . . . . .	6
*JPNS 4310 and 4320 Classical Japanese 1 and 2 . . . . .	6
JPNS 4300 Open Topics . . . . .	3
JPNS 4900 Independent Study . . . . .	1-3
JPNS 4950 Honors Thesis . . . . .	3

### Japanese Language and Civilization Track

Requires successful completion of 30 credit hours, apportioned as follows:

JPNS 2120 Intermediate Japanese . . . . .	5
JPNS 3110 and 3120 Advanced Japanese 1 and 2 . . . . .	10

The remaining 15 credits may be chosen from other JPNS or EALC courses, excluding only language courses numbered below 2120. Six of these remaining credit hours may be satisfied by courses focusing wholly or substantially on Japan offered in other departments, subject to approval by the undergraduate advisor in Japanese.

Of the 30 credit hours presented for the degree, at least 18 must be at the upper-division level.

### Graduating in Four Years with a BA in Japanese

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Japanese, students should meet the following requirements:

Declare the major in the first semester.

Students wishing to major in Japanese and who have no prior knowledge of the language should begin the required major courses no later than the sophomore year.

Students must consult with a major advisor to determine adequate progress toward completion of the major.

### Minor Program

A minor is offered in Japanese. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Courses Taught in English

The department offers several courses in translation. These courses require no previous study of the language, history, or culture of the area involved and are open to all interested students, whether majors in this department or not. They provide excellent introductions to Chinese or Japanese literary and cultural history.

CHIN 105I is a core curriculum course in the area of literature and the arts that focuses on the great books of China, both ancient and modern. CHIN 244I and CHIN 337I concentrate on film and culture. CHIN 331I, 332I, 333I, and 334I concentrate, respectively, on medieval, ancient, late imperial, and modern Chinese culture. CHIN 335I and 336I are devoted to issues in fiction

and on women and the supernatural. CHIN 4750 (cross-listed with RLST) focuses on the historical development of Daoism.

EALC 101I provides an interdisciplinary introduction to the history, literature, religion, and art of both China and Japan before major contact with the Western world. EALC 102I focuses on the modern period, after major contact with the Western world. Both of these are core curriculum courses in the area of cultural and gender diversity.

JPNS 105I is a core curriculum course in the area of literature and the arts focusing on both ancient and modern great books of Japan.

JPNS 244I focuses on film and culture, JPNS 344I explores language and society. JPNS 381I, 382I, 383I, and 384I focus, respectively, on classical, medieval, early modern, and modern Japanese literature. JPNS 384I meets the arts and sciences core requirement for critical thinking.

### Study Abroad

The department strongly recommends that all majors participate in study abroad. The University of Colorado is affiliated with study abroad programs based at Beijing, Nanjing, and East China Normal Universities in China; National Chengchi University in Taiwan; and the department has exchange programs with Kansai Gaidai, Sophia University, and Akita International University in Japan. Consult a departmental advisor. For further information, contact the Office of International Education. Note, however, that not more than 20 transfer credit hours from universities in the United States or abroad may count toward the major in Chinese or Japanese.

### Concurrent BA/MA Program

The concurrent BA/MA degree program in East Asian Languages and Civilizations language and literature tracks offers a challenging and focused academic experience for exceptional students who demonstrate the ability to express their ideas clearly, both orally and in written form, using standard English. Highly motivated students who are accepted into the program begin graduate work no later than the senior year and earn both the BA and MA in five years. Students must have a minimum 3.25 GPA for all courses taken at CU-Boulder and must have completed most MAPS and core requirements by the end of the sophomore year. Three letters of recommendation indicating strong potential for advanced intensive study also are required. Applications will be reviewed by the graduate faculty in Chinese or Japanese. For specific requirements, please contact the department.

### BA/MSIB Program (Bachelor of Arts in Chinese or Japanese/Master of International Business)

The Department of Asian Languages and Civilizations, in conjunction with the Business School at the University of Colorado Denver, offers a degree track in either Japanese or Chinese leading to accelerated admission to the UC Denver MSIB program. Students complete the standard requirements for the Japanese or Chinese major and a block of basic courses in Boulder Leeds School of Business. These courses, along with Japanese or Chinese language and culture requirements, are counted by the UC Denver Business School, allowing ALC graduates to complete the MSIB on an accelerated schedule. ALC students are also given special consideration for fellowship funding at UC Denver. See the undergraduate advisor for details.

## Master's Degree Requirements

Applicants to the graduate program in Asian Languages and Civilizations (Chinese or Japanese emphasis) should have successfully completed the equivalent of the undergraduate major in Chinese or Japanese language and literature with advanced competence in modern Chinese or Japanese, an introduction to classical Chinese or Japanese, an understanding of the interrelationship of Chinese or Japanese language and society, and a familiarity with the history, major writers, and works of Chinese or Japanese literature. Foreign applicants must submit results from a TOEFL exam, with 560 being the minimum acceptable score.

The MA may be pursued in one of four different tracks: Chinese language and literature, Japanese language and literature, Chinese language and civilization, and Japanese language and civilization. All entering students must take either CHIN 5010 or JPNS 5010 at the earliest opportunity. Students employed as teaching assistants also must take CHIN/JPNS 5020 Methods of Teaching Asian Languages. Selection of courses beyond these is made in consultation with the graduate advisor. Minimum requirements for graduation include a total of 24 hours of course work numbered 5000 or above, plus a thesis of 6 credit hours, or 30 hours of course work without a thesis. If deemed appropriate by the student's graduate committee, up to three courses (9 credit hours) taken outside the department may be included in the graduate curriculum.

### Dual Master's Program

The Department of Asian Languages and Civilizations also participates in a dual master's program with the Departments of History and Religious Studies. Students interested in exploring this option should contact the department for specific requirements.

## Asian Studies

*Degree* ..... BA

The Asian Studies Program offers a broad interdisciplinary undergraduate major in Asian studies. In addition, a number of departments offer graduate training with an emphasis on Asia.

Students planning to major in Asian studies may participate in study abroad programs with prior approval from the Asian Studies Program and the Office of International Education.

For additional information on the major program, contact Tim Weston at 303-492-3526.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
ASIA 1000 Introduction to South and Southeast Asian Studies or HIST 1408 Introduction to South Asian History . . . . .	3
EALC 1011 Introduction to Traditional East Asian Civilizations or EALC 1021 East Asian Civilizations: Modern Period . . . . .	4
Two courses in Asian history. . . . .	3/3
Three semesters of a single Asian language. . . . .	9-15
ASIA 4830 Senior Thesis or Project in Asian Studies . . . . .	3

Complete additional credit hours to accumulate the 40 credits needed for the major. At least 18 credit hours must be in upper-division courses and at least one course must be taken in both the humanities and social science. Select from the following approved Asian studies courses.

### Approved Asian Studies Courses

Most classes are offered for 3 credit hours. Not all classes are taught every semester or even every year. Other courses (includ-

ing some study abroad courses) with primarily Asia-related content may be taken for major credit with the faculty advisor's approval.

ANTH 1100 Exploring a Non-Western Culture: The Tamils  
 ANTH 1105 Exploring a Non-Western Culture: Tibet  
 ANTH 1110 Exploring a Non-Western Culture: Japan  
 ANTH 4690 Anthropology of Tibet  
 ANTH 4750 Culture and Society in South Asia  
 ANTH 4760 Ethnography of Southeast Asia and Indonesia  
 ARAB 1010, 1020 Beginning Arabic  
 ARAB 2110, 2120 Intermediate Arabic  
 ARAB 3010 Advanced Arabic  
 ARAB 3230 Islamic Culture and the Iberian Peninsula  
 ARTH 2409 Introduction to Asian Art  
 ARTH 3609 East Asian Ceramics  
 ARTH 3619 Chinese Painting  
 ARTH 3629 The Arts of Japan  
 ARTH 4029 Art of Islam  
 ARTH 4449 Art of India and Southeast Asia  
 ARTH 4469/5469 Chinese Painting  
 ARTH 4499/5499 Arts of Vietnam  
 ASIA 1000 South and Southeast Asian Civilizations  
 ASIA 4300 Open Topics  
 ASIA 4830 Senior Thesis or Project in Asian Studies  
 ASIA 4840 Independent Study  
 ASIA 4930 Engage Asia: Internship in Asian Studies  
 CHIN 1010, 1020 First-Year (Beginning) Chinese  
 CHIN 1051 Masterpieces of Chinese Literature in Translation  
 CHIN 1061 Voices and Images of Chinese Women  
 CHIN 2110, 2120 Second-Year (Intermediate) Chinese  
 CHIN 2441 Film and the Dynamics of Chinese Culture  
 CHIN 3110, 3120 Third-Year (Advanced) Chinese 1 and 2  
 CHIN 3311 The Dao and the World in Medieval China  
 CHIN 3321 Culture and Literature of Ancient China  
 CHIN 3331 Culture and Literature of Late Imperial China  
 CHIN 3341 Modern Chinese Literature in Translation  
 CHIN 3351 Reality and Dream in Traditional Chinese Fiction  
 CHIN 3361 Women and the Supernatural in Chinese Literature  
 CHIN 3371 Topics in Chinese Film  
 CHIN 3441 Language and Chinese Society  
 CHIN 3451 Language and Gender in China  
 CHIN 4110, 4120 Advanced Readings in Modern Chinese 1 and 2  
 CHIN 4210 Introduction to Classical Chinese  
 CHIN 4220 Readings in Classical Chinese  
 CHIN 4300 Open Topics in Chinese Literature  
 CHIN 4750 Daoism  
 CHIN 4900 Independent Study  
 CHIN 4950 Honor Thesis  
 EALC 1011 Introduction to Traditional East Asian Civilizations  
 EALC 1021 Introduction to Modern East Asian Civilizations  
 EALC 4930 Internship  
 ECON 4433 Economics of the Pacific Area  
 EMUS 1467/3467 Japanese Gamelan Ensemble  
 EMUS 2772 World Musics: Asia  
 FILM 2513 Major Asian Filmmakers  
 FRSI 1010, 1020 Beginning Farsi  
 FRSI 2010, 2020 Intermediate Farsi  
 FRSI 3010, 3020 Advanced Farsi  
 GEOG 3822 Geography of China  
 GEOG 4822 Environment and Development in China  
 HIND 1010, 1020 Beginning Hindi  
 HIND 1011 Indian Civilization  
 HIND 2010, 2020 Intermediate Hindi  
 HIND 2441 Screening India: A History of Bollywood Cinema  
 HIND 3010, 3020 Advanced Hindi  
 HIND 3651 Living Indian Epics  
 HIND 3661 South Asian Diasporas  
 HIND 3811 Subversive Indo-Pakistani Literature  
 HIND 3821 *Mahabharata* as Literature

HIND 3831 Krishna in South Asian Literature  
 HIST 1408 Introduction to South Asian History  
 HIST 1608 Introduction to Chinese History  
 HIST 1708 Introduction to Japanese History  
 HIST 2166 The Vietnam Wars  
 HIST 2629 China in World History  
 HIST 3328 Seminar in Middle Eastern History  
 HIST 3628 Seminar in Recent Chinese History  
 HIST 3718 Seminar in Japanese History  
 HIST 4109 WWII in Asia and the Pacific  
 HIST 4166 The War in Vietnam and Its Legacy  
 HIST 4328 Modern Middle East  
 HIST 4528 Islam in South and Southeast Asia  
 HIST 4538 History of Modern India  
 HIST 4558 Modern Indian Intellectual History  
 HIST 4618 Traditional China  
 HIST 4619 Women in Asian History  
 HIST 4628 Modern China  
 HIST 4638 Contemporary China  
 HIST 4648 History of Modern Chinese Intellectual Thought  
 HIST 4658 China and Islam  
 HIST 4718 Ancient, Classical, and Medieval Japanese History  
 HIST 4728 Modern Japanese History  
 HIST 4738 History of Early Modern Japan  
 INDO 1010, 1020 Beginning Indonesian  
 INDO 1011 Introduction to Indonesian Civilization  
 INDO 2010, 2020 Intermediate Indonesian  
 INDO 3010, 3020 Advanced Indonesian  
 JOUR 4871 Asian Media Systems  
 JPNS 1010, 1020 Beginning Japanese  
 JPNS 1051 Masterpieces of Japanese Literature in Translation  
 JPNS 2110, 2120 Intermediate Japanese  
 JPNS 2441 Film and Japanese Culture  
 JPNS 3110, 3120 Advanced Japanese  
 JPNS 3441 Language and Japanese Society  
 JPNS 3811 Classical Japanese Literature in Translation  
 JPNS 3821 Medieval Japanese Literature in Translation  
 JPNS 3831 Early Modern Japanese Literature in Translation  
 JPNS 3841 Modern Japanese Literature in Translation  
 JPNS 4030 Japanese Syntax  
 JPNS 4070 Second Language Acquisition of Japanese  
 JPNS 4080 Kanji in Japanese Orthography  
 JPNS 4110, 4120 Readings in Modern Japanese  
 JPNS 4210 Contemporary Japanese 1  
 JPNS 4220 Contemporary Japanese 2  
 JPNS 4300 Readings in Japanese Literature  
 JPNS 4310, 4320 Classical Japanese  
 JPNS 4900 Independent Study  
 JPNS 4950 Honors Thesis  
 INDO 1010 Beginning Indonesian 1  
 INDO 1020 Beginning Indonesian 2  
 INDO 2010 Intermediate Indonesian 1  
 KREN 1010, 1020 Beginning Korean  
 KREN 1011 Introduction to Korean Civilization  
 KREN 2110, 2120 Intermediate Korean  
 KREN 3110 Advanced Korean 1  
 KREN 3120 Advanced Korean 2  
 KREN 3441 Religion and Culture in Korea  
 KREN 4900 Independent Study  
 MUEL 2772 World Musics: Asia  
 MUSC 4152 East Asian Music  
 PSCI 3072 Government and Politics in Southeast Asia  
 PSCI 4028 Special Topics: Politics of Contemporary Japan  
 PSCI 4052 Political Systems of China, Japan, and Korea  
 RLST 2610 World Religions: India  
 RLST 2620 World Religions: China and Japan  
 RLST 3200 Hinduism  
 RLST 3300 Foundations of Buddhism  
 RLST 3400 Japanese Religions

RLST 3600 Islam  
 RLST 3800 Chinese Religions  
 RLST 4200 Topics in Hinduism  
 RLST 4250/5250 Topics in Buddhism  
 RLST 4650 Islam and the Modern World  
 RLST 4700/5700 Confucianism  
 RLST 4750/5750 Daoism  
 RLST 4760 Sufism  
 WMST 3220 Women in Islam

## Astrophysical and Planetary Sciences

*Degrees* ..... BA, MS, PhD

The undergraduate major has two tracks—one in general astronomy and one in astrophysics/physics (see the website at [aps.colorado.edu](http://aps.colorado.edu)).

The track in general astronomy is designed to meet student needs for basic, undergraduate training in space sciences (astronomy, astrophysics, planetary sciences, and space physics). Undergraduates are prepared for both academic research careers and the industrial market (aerospace, computer software, instrumentation, and other technical areas) as well as for science education, science journalism, and space policy. This track provides a liberal arts degree in the science of astronomy, observations, and technology as well as core training in astronomical sciences and mathematics, applied physics, and computational and instrumental technology for professions in the space sciences. The track can focus on observations (ground-based telescopes, rocket probes, space-borne observatories) or on K-12 science education, for which astronomy provides excellent science content for motivating young students. It also offers broad training for careers in science policy and science writing.

The bachelor's degree track in astrophysics/physics is directed toward students interested in pursuing graduate studies in astrophysics by focusing on multidisciplinary work in physics and mathematics together with astronomy. Graduates are provided with scientific and technological training in the space sciences, including mathematical, physical, computational, and instrumental expertise. A senior thesis or other research work is encouraged.

Specific goals for both programs are to provide:

- both theoretical and practical knowledge of astronomy and astrophysics at a level comparable to the best programs at other major U.S. public institutions. The Department of Astrophysical and Planetary Sciences is one of the few programs that combines both astrophysics and planetary science, providing a unified view of space sciences, the solar system and comparative planetology, stellar and galactic astronomy, and cosmology.
- courses and significant hands-on experience with telescopes, optics, instrumentation, and computer image processing and modeling. These skills are useful for students wishing to pursue graduate degrees or careers in aerospace, technical, or computer industries.
- opportunities for faculty-advised research and senior (honors) theses.

### Bachelor's Degree Program

A major with two tracks (general astronomy and astrophysics/physics) was approved by the Regents and CCHE on June 1, 2000.

### General Astronomy Track

This is appropriate for someone aiming for a career in K–12 education, science journalism, science policy, information technology, science management, or technical work that does not require a graduate degree.

ASTR 1030 and 1040 Accelerated Introductory Astronomy or ASTR 1010 and 1020 Introductory Astronomy . . . . .	8
PHYS 1110, 1120, and 1140 General Physics 1 and 2 . . . . .	9
APPM 1350 and 1360 or MATH 1300 and 2300 Calculus 1 and 2 . . . . .	8-10
One of the following four courses:	
ASTR/ASEN 2500 Gateway to Space . . . . .	3
ASTR 2600 Computational Techniques . . . . .	3
PHYS 2130 General Physics . . . . .	3
PHYS 2170 Foundations of Modern Physics . . . . .	3
Minimum of two additional courses selected from:	
ASTR 2000 Ancient Astronomies . . . . .	3
ASTR 2010 Modern Cosmology . . . . .	3
ASTR 2020 Introduction to Space Astronomy . . . . .	3
ASTR 2030 Black Holes . . . . .	3
ASTR 2500 Gateway to Space . . . . .	3
ASTR 2600 Computational Techniques . . . . .	3
ASTR 3300 Extraterrestrial Life . . . . .	3
One other science sequence with lab. Can be satisfied by any sequence that satisfies arts and sciences core curriculum in natural sciences with lab, for example:	
CHEM 1113, 1114, and 1131, 1134; EBIO 1210–1230, GEOL 1010, 1020, and 1030, ATOC 1050, 1060, and 1070, or equivalent . . . . .	7-10

One upper-division course sequence:

ASTR 3720 Planets and their Atmospheres and ASTR 3750 Planets, Moons, and Rings or	
ASTR 3730 Astrophysics 1: Stellar and Interstellar and ASTR 3830 Astrophysics 2: Galactic and Extragalactic . . . . .	6

Four additional courses from the following or from those sequence courses not used for the upper-division sequence requirement, above:

ASEN 4010 Introduction to Space Dynamics . . . . .	3
ASTR 3510 Observations and Instrumentation 1 . . . . .	4
ASTR 3520 Observations and Instrumentation 2 . . . . .	4
ASTR 3710 Formation and Dynamics of Planetary Systems . . . . .	3
ASTR 3740 Cosmology and Relativity . . . . .	3
ASTR 3760 Solar and Space Physics . . . . .	3
ASTR 3800 Scientific Data Analysis and Computing . . . . .	3
ASTR 4330 Cosmochemistry . . . . .	3
ASTR 4800 Space Practice and Policy . . . . .	3
ASTR 5760 Astrophysical Instrumentation (with instructor's permission) . . . . .	3
ATOC 4720 Atmospheric Physics and Dynamics . . . . .	3

A minor is available that may be satisfied by taking various combinations of courses among the diverse possibilities offered by the department (see below).

### Astrophysics/Physics Track (Jointly Supervised by the APS and Physics Departments)

For students aiming for a graduate program in astronomy or planetary sciences. Similar to Physics Plan 2 (Astrophysics), with additional astrophysics instrumentation labs and different electives.

Required Courses	Semester Hours
APPM 1350, 1360, 2350, and 2360 Calculus 1, 2, 3, and 4 or MATH 1300, 2300, 2400, and APPM 2360 Analytic Geometry and Calculus 1, 2, and 3 and Introduction Differential Equations with Linear Algebra . . . . .	16-18
ASTR 1030 and 1040 Accelerated Introductory Astronomy . . . . .	8
ASTR 3720 and 3750 planetary sequence or ASTR 3730 and 3830 stellar/galactic sequence . . . . .	6
PHYS 1110, 1120, and 1140 General Physics 1 and 2 and PHYS 2150, 2170, and 2210 Sophomore Physics . . . . .	16

PHYS 3310 and 3320 Electromagnetism and PHYS 3210 and 3220 Classical and Quantum Mechanics . . . . .	12
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Suggested electives: PHYS 4230 Thermodynamics and Statistical Mechanics or PHYS 4410 Quantum Mechanics II or PHYS 4420 Nuclear and Particle Physics or PHYS 4510 Optics or PHYS 4150 Plasma Physics

Three additional courses from the following or any of 3720, 3750, 3730, 3830 not used for the requirement above:

ASEN 4010 Introduction to Space Dynamics . . . . .	3
ASTR 3510 Observations and Instrumentation 1 . . . . .	4
ASTR 3520 Observations and Instrumentation 2 . . . . .	4
ASTR 3710 Formation and Dynamics of Planetary Systems . . . . .	3
ASTR 3740 Cosmology and Relativity . . . . .	3
ASTR 3760 Solar and Space Physics . . . . .	3
ASTR 3800 Scientific Data Analysis and Computing . . . . .	3
ASTR 4010/4020 Senior Research Practicum . . . . .	3 each
ASTR 4330 Cosmochemistry . . . . .	3
ATOC 4720 Atmospheric Physics and Dynamics . . . . .	3

Any 5000- or 6000-level physical and planetary sciences course with instructor's permission . . . . .

Total credit hours for the major 23 hours minimum in astrophysics and 28 hours minimum in physics (this must include at least 15 upper-division hours in astrophysics and 12 in physics).

### Minor Program

Declaration of a minor in astrophysical and planetary sciences is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [aps.colorado.edu/undergrad\\_APSMinor\\_courserequirements.html](http://aps.colorado.edu/undergrad_APSMinor_courserequirements.html).

A total of 18 credit hours is required for the minor, at least 9 of which must be taken at the upper-division (3500 and above) level. For guidance, see an astrophysical and planetary sciences (APS) faculty advisor or request written information from the departmental office.

### Graduate Degree Programs

The curriculum and research in the department emphasizes three major areas: astrophysics, planetary sciences, and space physics.

The department offers both MS and PhD degrees. During the first year of graduate study, students generally obtain a broad background in courses regarded as basic to all three areas in addition to more specialized studies. Many students take graduate-level courses in other departments (e.g., Departments of Physics, Chemistry and Biochemistry, Geological Sciences, Applied Mathematics, or Aerospace Engineering), depending upon their particular interests or participation in interdisciplinary programs (see below). The basic first-year courses in the three areas are:

ASTR 5110 Atomic and Molecular Processes
ASTR 5120 Radiative and Dynamical Processes
ASTR 5400 Introduction to Fluid Dynamics
ASTR 5540 Mathematical Methods
ASTR 5550 Observations, Data Analysis, and Statistics

Descriptions of more specialized courses follow. Students interested in applying to this department are invited to write to Graduate Program Assistant, Department of Astrophysical and Planetary Sciences, University of Colorado at Boulder, 391 UCB, Boulder, CO 80309-0391.

### Astrophysics (Including Solar Physics)

The department offers a broad range of courses and research in this area, leading to the PhD degree. Graduate-level courses are offered in the following subjects:

ASTR 5140 Astrophysical and Space Plasmas
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ASTR 5700 Stellar Structure and Evolution  
 ASTR 5710 High-Energy Astrophysics  
 ASTR 5720 Galaxies  
 ASTR 5730 Stellar Atmospheres and Radiative Transfer  
 ASTR 5740 Interstellar Astrophysics  
 ASTR 5760 Astrophysical Instrumentation  
 ASTR 5770 Cosmology  
 ASTR 6000 Seminar in Astrophysics

Research in observational and theoretical astrophysics is conducted in the following areas:

Stellar atmospheres, radiative transfer, stellar winds of hot/cool stars  
 Formation of stars and planetary systems  
 Solar physics  
 Interstellar and intergalactic medium  
 Cosmology and large-scale structure of the universe; galaxy formation  
 Stellar interiors, pulsations, black holes, and neutron stars  
 Cosmic X-ray sources, supernovae and their remnants, and accretion phenomena jets and clusters of galaxies  
 Galactic evolution, quasars, and active galaxies  
 Radio and sub-millimeter astronomy, microwave background  
 Plasma astrophysics and MHD  
 Astrophysical fluid dynamics  
 Laboratory and atomic astrophysics  
 UV, optical, IR, submillimeter, and X-ray instrumentation  
 Instrument and detector development

### *Departmental Equipment and Research*

Research is carried out with the ARC 3.5m Apache Point telescope and with national telescopes and laboratories and international collaborators: High Altitude Observatory (HAO) in Boulder (solar physics), National Optical Astronomical Observatories in Tucson and Chile (optical astronomy), Caltech Sub-Millimeter Observatory, National Radio Astronomy Observatory (NRAO), the Very Large Array (VLA), the Green Bank Telescope (GBT), the Hubble Space Telescope (HST), the Chandra, SWIFT, and XMM X-ray telescopes, and the Fermi Gamma-Ray Space Telescope. CU-Boulder also is involved with the FUSE ultraviolet satellite, Cassini, Galileo, and New Horizons (Pluto) missions, and the HST Cosmic Origins Spectrograph.

Locally, APS operates a 24-inch Cassegrain-Coude and 16- and 18-inch Cassegrain telescopes, available for photographic, photometric, and spectrographic observations, as well as for instrument and detector development. Opportunities for graduate research also are found with the university's Laboratory for Atmospheric and Space Physics (LASP), the Center for Astrophysics and Space Astronomy (CASA), and JILA. See Graduate School for more information.

### *Planetary Sciences*

As planetary sciences is an interdisciplinary field, students can obtain degrees from the Departments of Astrophysical and Planetary Sciences, Geological Sciences, Physics, or Aerospace Engineering. CU-Boulder is also home to a division of the Southwest Research Institute, with over 25 planetary scientists, many of whom work with CU students. Research and courses related to the physics and dynamics of the atmospheres of other planets, planetary surfaces and interiors, and other solar system studies are available in programs leading to the MS and PhD degrees. Courses related to the physics and dynamics of the Earth's atmosphere are offered through PAOS under the ATOC acronym. Graduate-level courses in these areas are:

ASTR 5140 Astrophysical and Space Plasma  
 ASTR 5300 Introduction to Magnetospheres  
 ASTR 5330 Cosmochemistry  
 ASTR 5410 Fluid Instabilities, Waves, and Turbulence

ASTR 5800 Planetary Surfaces and Interiors  
 ASTR 5810 Planetary Atmospheres  
 ASTR 5820 Origin and Evolution of Planetary Systems  
 ASTR 5830 Topics in Planetary Science  
 ASTR 5835 Seminar in Planetary Science  
 ATOC 5050 Physical Processes of the Atmosphere and Ocean  
 ATOC 5560 Radiative Processes in Planetary Atmospheres  
 ATOC 5960 Theories of Climate and Climate Variability

Research in theoretical, observational, and laboratory atmospheric and planetary science is conducted in the following areas:

Planetary disks, Kuiper Belt objects, extra-solar planets;  
 Dynamics and chemistry of planetary atmospheres, planetary clouds, and planetary climates; evolution of planetary atmospheres; and comparison of planetary and terrestrial atmospheres;  
 Planetary aeronomy, airglow and aurora, UV and IR spectroscopy, noctilucent clouds, structure and composition of planetary atmospheres (Venus, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto), planetary magnetospheres, and cometary physics;  
 Satellite monitoring of the Earth's atmosphere and environment, including remote sensing of mesospheric ozone, stratospheric trace species, convection, outgoing radiation, and magnetospheric dynamics; and  
 Planetary geology, planetary interiors and surfaces, and planetary geophysics.

Graduate research opportunities exist with individual faculty members, as well as jointly with academic and research units such as the Departments of Geological Sciences, Physics, and Aerospace Engineering, as well as the Department of Atmospheric and Oceanic Sciences (ATOC), the National Center for Atmospheric Research (NCAR), the National Oceanic and Atmospheric Administration (NOAA), and the Laboratory for Atmospheric and Space Physics (LASP). The latter is involved in space investigations of the Earth, Sun, and planets. Financial support is available in connection with all of the above research activities.

### *Atmospheric and Oceanic Sciences*

This interdisciplinary program provides an educational and research environment to examine the dynamical, physical, and chemical structures of the atmosphere, ocean, and land surface, and the manner in which they interact. For further information, see the ATOC listing. APS participates in the master's degree program in computational science (under applied math).

### *Geophysics*

The department participates in the interdepartmental PhD program in geophysics. For further information, refer to the discussion of the geophysics program in the Graduate School section.

### *Departmental Requirements*

Those wishing to pursue graduate work in APS leading to candidacy for an advanced degree should carefully read requirements for advanced degrees in the Graduate School section. The following are special departmental requirements.

### *Master's Degree*

**Prerequisites.** A thorough undergraduate preparation in physics and mathematics is necessary for graduate study. Courses should include thermodynamics, mechanics, electricity and magnetism, quantum mechanics, atomic physics, and mathematics at least through complex variables and differential equations.

**Qualifying Examination.** The Graduate Record Examination aptitude tests and advanced test in physics are used in place of a qualifying examination, and this examination should be taken before the time of application to the department.



**Preliminary Interview.** Students in the Department of Astrophysical and Planetary Sciences are given an oral interview prior to the beginning of the fall semester of their first year. This oral interview examines fundamental knowledge in undergraduate physics and mathematics. Students are required to overcome any academic deficiencies within a year in order to remain in the program.

**Course Requirements.** Under Plan I, a student must present a thesis for 6 credit hours plus 24 credit hours of course work, at least 12 of which must be APS courses numbered 5000 or above. Under Plan II, additional hours of approved graduate courses must be presented for a total of 30 credit hours, of which at least 16 must be APS courses numbered 5000 or above. The master's examination under Plan I covers the thesis and related topics. The examination under Plan II is more comprehensive and may be either written or oral or both. Master's examinations are given after other degree requirements have been completed, but may be given during the last semester of residence if the student is making satisfactory progress on required courses.

### Doctoral Degree

In addition to the master's degree requirements above, PhD students must complete the following.

**Course Requirements.** A minimum of 39 semester hours of work (including 4 hours of graduate seminars) in courses numbered 5000 or above is required; however, the overall emphasis is on independent study and research.

**Language Requirement.** None.

**Examinations.** Students in the PhD program are required to remove any deficiencies identified at the preliminary interview, to pass a two-part comprehensive examination composed of a written test on graduate course material and an oral exam on a research paper based on a semi-independent research project, and satisfactorily defend the thesis before a faculty committee.

## Atmospheric and Oceanic Sciences

*Degrees* ..... *MS, PhD*

The Department of Atmospheric and Oceanic Sciences (ATOC) is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical, and chemical processes in the atmosphere, ocean, and land surface, and the manner in which they interact. A major theme is the establishment of a physical basis for understanding, observing, and modeling climate and global change.

Although an undergraduate degree program is not yet offered in ATOC, an undergraduate minor program is available. A total of 18 credit hours is required for the minor, including 9 lower-level ATOC credit hours and 9 upper-level ATOC credit hours. A full list of approved courses for the minor is available online and in the ATOC administrative offices.

Graduate students admitted to ATOC are eligible to receive an advanced degree in atmospheric and oceanic sciences. Graduate students outside of ATOC can pursue the Graduate Certificate in Atmospheric and Oceanic Sciences while earning a graduate degree from another department at CU-Boulder, or while taking course work as a non-degree-seeking student through Continuing Education's ACCESS Program provided they have already earned a bachelor's degree and meet the course prerequisites. In addition, students inside and outside the department may pursue a Graduate Certificate in Oceanography. For more informa-

tion on graduate certificate programs, see the Graduate School/Interdisciplinary Programs section.

For more information about ATOC programs and application procedures, call the ATOC office at **303-492-6633**, or visit [atoc.colorado.edu](http://atoc.colorado.edu).

### Graduate Degree Program

ATOC offers a comprehensive graduate program with a core course structure that emphasizes the fluid dynamical, chemical, and physical processes in the atmosphere and ocean.

All ATOC graduate students are required to take one of the two following ATOC core course tracks, or their equivalent:

#### *Atmosphere Track (A-Track)*

ATOC 5050: Intro to Atmospheric Dynamics  
 ATOC 5600: Physics and Chemistry of Clouds and Aerosols  
 ATOC 5235: Intro to Atmospheric Radiative Transfer and Remote Sensing  
 ATOC 5060: Dynamics of the Atmosphere  
 ATOC 5051: Intro to Physical Oceanography  
 ATOC 5151: Atmospheric Chemistry

#### *Physical Oceanography Track (PO-Track)*

ATOC 5050: Intro to Atmospheric Dynamics  
 ATOC/ASTR 5400: Intro to Fluid Dynamics  
 ATOC/ASEN 5215: Descriptive Physical Oceanography (previously Oceanography)  
 ATOC 5051: Intro to Physical Oceanography  
 ATOC 5061: Dynamics of Oceans  
 ATOC/GEOL 5270: Marine Chemistry and Geochemistry

All ATOC graduate students must select one of these tracks upon entering the program with a track selection form. The degree will be in atmospheric and oceanic sciences, regardless of track chosen. The master's thesis or doctoral dissertation topic is not constrained by choice of track.

ATOC offers many graduate elective courses, and students are encouraged to take related electives offered by other departments.

**Prerequisites.** An undergraduate degree in mathematics, physics, engineering, chemistry, or another natural science is recommended. The general prerequisites expected of incoming graduate students include undergraduate courses in calculus, linear algebra, differential equations, and computer programming; as well as one-year sequences of undergraduate calculus-based physics and chemistry. Upper-division undergraduate courses in physics, chemistry, engineering, and mathematics are strongly recommended. Undergraduate courses in atmospheric and oceanic sciences are useful, but not expected, as part of the undergraduate background.

#### *Master's Degree*

**Course Requirements.** For both thesis and nonthesis options, a total of 30 credit hours is required with at least 15 credit hours of ATOC courses numbered 5000 and above. Other specific course requirements are in the *ATOC Graduate Handbook*.

**Examinations.** For the thesis option, the final examination consists of an oral exam on the thesis. There is a written final exam for the nonthesis option.

#### *Doctoral Degree*

**Course Requirements.** A total of 36 credit hours is required including the 18 credit hours in ATOC core courses listed above, as well as a graduate-level course in applied or computational mathematics. In addition, 30 dissertation hours are required.

Other specific course requirements are covered in the *ATOC Graduate Handbook*.

**Examinations.** Students must pass a two-part comprehensive examination before admission into candidacy. Part I of the comprehensive examination is a written exam based on course material and is normally taken in the second year. Part II of the comprehensive examination is normally taken in the third year and is an oral examination based on an original research paper prepared by the student. After the PhD dissertation has been submitted, a final examination of the dissertation will be conducted.

## Bibliography

Several courses in information access and library research methods are offered to students who wish to explore the structure, organization, retrieval, and evaluation of information for their study and career needs. See the course descriptions under Library Research for more information.

## Biological Sciences

Course work and degree programs in the biological sciences are offered through the Department of Ecology and Evolutionary Biology (formerly the Department of Environmental, Population, and Organismic Biology); the Department of Molecular, Cellular, and Developmental Biology; and the Department of Integrative Physiology (formerly the Department of Kinesiology and Applied Physiology). Students should refer to program and course descriptions listed for each department.

## British and Irish Studies

The Center for British and Irish Studies encourages students to develop programs that include a focus on British and Irish culture, history, and contemporary life from a variety of disciplinary perspectives. At the undergraduate level, the center offers a certificate in British and Irish studies for students who have taken 24 credit hours in British and Irish literature, history, and/or other fields.

For graduate students, it offers occasional interdisciplinary seminars. These offer exposure to methods and sources outside the students' own departments and provide preprofessional training in presenting research. The center has funds for acquiring microfilm collections for dissertation research, and offers travel fellowships for graduate students.

For more information, contact the Center for British and Irish Studies at 303-492-0017 or [jill.heydt@colorado.edu](mailto:jill.heydt@colorado.edu). For more information go to [www.colorado.edu/artssciences/british](http://www.colorado.edu/artssciences/british).

## Central and East European Studies

Students who seek in-depth, interdisciplinary knowledge of the region are encouraged to pursue the certificate in Central and East European studies. The certificate program offers students the opportunity to explore the culture, history, and politics of the nations of central and eastern Europe from a variety of disciplinary perspectives.

The purpose of the certificate program is to enhance, rather than to replace, the department major. Students work with CEES faculty advisors to plan an appropriate certificate program. The certificate is issued by the dean of the College of Arts and Sciences, and is awarded in addition to a bachelor's degree in another field.

The certificate program involves 24 hours of credit, including an introductory course (CEES 2002) and at least one course from each of three core clusters (historical, social science, and literature/culture). Students pursuing the CEES certificate are strongly encouraged to take advantage of a recognized study abroad program in Eastern Europe affiliated with CU-Boulder. Courses taken in such a program, as approved by an advisor, count toward the certificate in CEES. Only 9 credits that apply to the major can be used to fulfill requirements for the CEES certificate.

Contact the director of Central and East European Studies, Professor Elizabeth Dunn at 303-492-5388 for information.

## Chemistry and Biochemistry

*Degrees* ..... BA, MS, PhD

The undergraduate degree in chemistry and biochemistry emphasizes knowledge and awareness of:

- the basic principles of chemistry—atomic and molecular theory, reactivities and properties of chemical substances, and the states of matter;
- the basic subfields of chemistry—organic, physical, analytical, and inorganic chemistry (and biochemistry for biochemistry majors);
- mathematics sufficient to facilitate the understanding and derivation of fundamental relationships and to analyze and manipulate experimental data;
- the basic principles of physics (and for biochemistry majors, knowledge of biology); and
- safe chemical practices, including waste handling and safety equipment.

In addition, students completing the degree in chemistry or biochemistry are expected to acquire the ability and skills to:

- read, evaluate, and interpret information on a numerical, chemical, and general scientific level;
- assemble experimental chemical apparatus, design experiments, and use appropriate apparatus to measure chemical composition and properties (for biochemistry students, this includes properties of proteins, nucleic acids, and other biochemical intermediates); and
- communicate results of scientific inquiries verbally and in writing.

## Bachelor's Degree Program

A student can earn a bachelor's degree in either chemistry or biochemistry. For either option, students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Required Courses

### Semester Hours

#### Chemistry Option

CHEM 1251 and 1271, General Chemistry 1 and 2 for Chemistry and Biochemistry Majors, or CHEM 1351 and 1371, Honors General Chemistry 1 and 2 (recommended for the student with advanced high school training in mathematics and physics). CHEM 1113/114 and 1133/1134 General Chemistry 1 and 2 lecture and lab, also accepted. . . .	10
CHEM 3351 and 3371 Organic Chemistry for Chemistry and Biochemistry Majors 1 and 2 or CHEM 3311 and 3331 Organic Chemistry 1 and 2. . . .	8
CHEM 3361 and 3381 Laboratory in Organic Chemistry 1 and 2 for chemistry majors . . . . .	4
CHEM 4011 Inorganic Chemistry. . . . .	3
CHEM 4171 Principles of Instrumental Analysis . . . . .	3

CHEM 4181 Instrumental Analysis Lab with Environmental Emphasis . . . . .	3
CHEM 4511 and 4531 Physical Chemistry 1 and 2 or CHEM 4411 and 4431 Physical Chemistry with Biochemistry Applications 1 and 2 . . . . .	6
CHEM 4581/4591 Physical Chemistry Labs 1 and 2 . . . . .	3
PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
MATH 1300, 2300, and 2400, Analytical Geometry, and Calculus 1, 2, and 3 or APPM 1350, 1360, and 2350 . . . . .	12

All students, and especially those intending to go on to graduate school in chemistry, will benefit from additional advanced courses. Recommended electives include the following: CHEM 4021, 4191, 4611, 4711, 4731, 4901, graduate courses in various fields of chemistry, or advanced courses in mathematics or physics.

### Biochemistry Option

CHEM 1251 and 1271, General Chemistry 1 and 2 for Chemistry and Biochemistry Majors, or CHEM 1351 and 1371, Honors General Chemistry 1 and 2 (recommended for the student with advanced high school training in mathematics and physics). CHEM 1113/114 and 1133/1134 General Chemistry 1 and 2 lecture and lab, also accepted . . . 10	10
CHEM 3351 and 3371 Organic Chemistry for Chemistry and Biochemistry Majors 1 or 2 or CHEM 3311 and 3331 Organic Chemistry 1 and 2 . . . . .	8
CHEM 3321 and 3341 Laboratory in Organic Chemistry 1 and 2 or CHEM 3361 and 3381 Laboratory in Organic Chemistry for Majors 1 and 2 . . . . .	4
CHEM 4411 and 4431 Physical Chemistry with Biochemistry Applications 1 and 2, or CHEM 4511 and 4531 Physical Chemistry 1 and 2 . . . . .	6
CHEM 4711 and 4731 General Biochemistry 1 and 2 . . . . .	6
CHEM 4761 Biochemistry Laboratory . . . . .	4
PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
MATH 1300, 2300, and 2400 Analytical Geometry and Calculus 1, 2, and 3 or APPM 1350, 1360, and 2350 . . . . .	12
MCDB 1150 Introduction to Molecular Biology, MCDB 1151 Intro to Molecular Biology Lab, MCDB 2150 Principles of Genetics, and MCDB 2151 Principles of Genetics Lab or EBIO 1210 and 1220 General Biology 1 and 2 and EBIO 1230 and 1240 General Biology Laboratory 1 and 2 (the latter is recommended for premed students) . . . . .	8
One of the following: MCDB 2150/2151 (if not taken above), MCDB 3120, 3500, EBIO 2070, 3400, 4530, or IPHY 3430. . . . .	3-4

All students, and especially those intending to go on to graduate school in biochemistry, will benefit from additional advanced courses. Recommended electives include the following: CHEM 4011, 4171, 4181, 4191, 4751, 4791, 4901, graduate courses in various fields of chemistry, or advanced courses in biology or mathematics.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain progress in chemistry and biochemistry, students should meet the following requirements:

Declare chemistry or biochemistry as the major in the first semester.  
Students must consult with a major advisor to determine adequate progress toward completion of the major.

### Minor Program

Minors are offered in chemistry and in biochemistry. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### American Chemical Society Certification

The American Chemical Society maintains a certification program in which a student graduating with a specified minimum program is certified to the society upon graduation. To be certified, a graduate must satisfy requirements in addition to the mini-

um for graduation. A list of these requirements may be obtained from the undergraduate Chemistry and Biochemistry office.

### Chemistry Honors Program

Opportunity is provided for qualified chemistry and biochemistry majors to participate in the departmental honors program and graduate with honors (cum laude, magna cum laude, or summa cum laude) in chemistry or biochemistry. Students interested in the honors program should contact the departmental honors advisor during their junior year.

Transfer students who plan to take a chemistry or biochemistry major must complete at the Boulder campus a minimum of 12 credit hours of upper-division work covering at least two subdisciplines: organic, physical, analytical, and inorganic for chemistry majors; biochemistry and physical for biochemistry majors.

A more detailed listing of the bachelor's degree program, together with advising information and alternate course options, is available at the undergraduate office in the Department of Chemistry and Biochemistry.

### Graduate Degree Programs

Students wishing to pursue graduate work in chemistry or biochemistry leading to candidacy for an advanced degree should read carefully requirements for advanced degrees in the Graduate School chapter. For information on the doctoral program in chemical physics offered jointly with the Department of Physics, see Chemical Physics under Interdepartmental Programs in the Graduate School section. Following are some of the special departmental requirements. Copies of more detailed rules are distributed to graduate students.

**Prerequisites.** An undergraduate major in chemistry, biochemistry, or a related field is desirable since entering graduate students are required to take examinations and complete selected course work covering the major fields of chemistry and biochemistry. The GRE general test and advanced subject test (in either chemistry or in biochemistry, cell, and molecular biology) is required for admission and for fellowship competition. Some or all of these tests may be waived under special circumstances.

### Master's Degree

**Language.** The department does not require foreign language proficiency for the master's degree.

**Examinations.** Administration of preliminary examinations varies, depending on students' entering field. Candidates opting for MS Plan I must pass a master's final oral examination at the time they complete their work. MS Plan II does not require a final oral examination.

**Course Requirements.** There are two methods of obtaining a master's degree from the Department of Chemistry and Biochemistry. Plan I requires 30 credit hours, including 15 credit hours of formal course work, 15 credit hours in research/seminar courses, the completion of a research investigation, and the presentation of a thesis. Plan II requires 30 credit hours including 21 credit hours of formal course work plus 9 credit hours of research/seminar, and presentation of a research report, but no thesis; Plan II is available only with departmental approval.

### Doctoral Degree

**Language.** The department does not require foreign language proficiency for the PhD degree.

**Examinations.** Administration of preliminary examinations varies, depending on students' entering field. These examinations are used in an advisory capacity. The minimum course work is 30 credit hours at the 5000, 6000, or 7000 level, of which 15 credit hours must be in formal course work. In addition, a minimum of 30 credit hours of dissertation work (CHEM 899T) is required. PhD students must pass a comprehensive examination consisting of a series of written cumulative exams and an oral examination. Students entering with a master's degree start the comprehensive examinations in their second semester; others start them in their third semester. Candidates must write a research proposal during their studies, complete a research investigation and present a thesis, and pass a PhD final oral examination at the time they complete their work.

**Classics**

*Degrees* ..... BA, MA, PhD

Through consultation with the undergraduate advisor, the bachelor's degree in classics is tailored to the student's interests in the field. Major and minor programs can be arranged with a concentration in either Latin or Greek or a combination of the two, with a focus on classical literature, culture, and thought (including mythology, literature, philosophy, religion, art, archaeology, and history) or with a particular emphasis on classical history, art, and archaeology. Prospective majors and minors should consult with the undergraduate advisor and review the departmental list.

The undergraduate degree in classics emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Greek and Roman literature, from Homer to the end of classical antiquity;
- the historical and cultural contexts of particular works; and
- the art, religion, and philosophy of ancient Greece and Rome and their roles in world cultural history.

In addition, students completing the degree in classics are expected to acquire the ability and skills to:

- read, understand, and interpret written documents and works of literature in ancient Greek or Latin where relevant, as well as in translation;
- communicate in spoken and written form with adequate clarity and complexity for the relevant audience; and
- read and think critically.

Interested students are encouraged to consult [www.colorado.edu/classics/undergrad](http://www.colorado.edu/classics/undergrad) for more information.

**Bachelor's Degree Program**

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below, including at least 18 credit hours of upper-division courses.

*Required Courses* ..... *Semester Hours*

**Track I: Greek, Latin, or Greek and Latin**

Greek and/or Latin ..... 30

*NOTE: Students must designate one language as the primary field of study. The first year of this language does not count toward the major. If you study both languages, the introductory sequence in the second language does count toward the major.*

Electives (classical literature, culture and thought or ancient history, art and archaeology courses listed under Tracks II and III) ..... 6

**Track II: Literature, Culture, and Thought**

Classical literature, culture, and thought (CLAS 1010, 1030, 1100, 1110, 1115, 1120, 1140, 2020, 2100, 2110, 2610, 3820, 4040, 4110, 4120, 4130, 4840; HEBR 1030; PHIL 3000) ..... 18  
 Ancient history, art, and archaeology (CLAS 1051, 1061, 1509, 2009, 2019, 2041, 3039, 3049, 4021, 4031, 4041, 4061, 4071, 4081, 4091, 4109, 4119, 4129, 4139, 4149, 4169, 4199, 4209, 4219, 4761, 4849; HIST 3011) ..... 12  
 Greek and/or Latin ..... 6

*NOTE: Students must designate either Greek or Latin as the primary field of language study. The first year of this language does not count toward the major. With the approval of the undergraduate advisor, upper-level Greek or Latin courses may be substituted for classical literature, culture, and thought or ancient history, art, and archaeology courses.*

**Track III: History, Art, and Archaeology**

Survey course in ancient history or art and archaeology (CLAS 1051, 1061, or 1509) ..... 3  
 Ancient history, art, and archaeology (CLAS 1051, 1061, 1509, 2009, 2019, 2041, 3039, 3049, 4021, 4031, 4041, 4061, 4071, 4081, 4091, 4109, 4119, 4129, 4139, 4149, 4169, 4199, 4209, 4219, 4761, 4849; HIST 3011) ..... 15  
 Classical literature, culture, and thought (CLAS 1010, 1030, 1100, 1110, 1115, 1120, 1140, 2020, 2100, 2110, 2610, 3820, 4040, 4110, 4120, 4130, 4840; HEBR 1030; PHIL 3000) ..... 12  
 Greek and/or Latin ..... 6

*NOTE: Students must designate either Greek or Latin as the primary field of language study. The first year of this language does not count toward the major. With the approval of the undergraduate advisor, upper-level Greek or Latin courses may be substituted for classical literature, culture, and thought or ancient history, art, or archaeology courses.*

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in classics, students should meet the following requirements:

Declare the classics major by the beginning of the second semester. Students must consult with a major advisor to determine adequate progress toward completion of the major.

**Minor Program**

A minor is offered in classics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html) or [www.colorado.edu/classics/undergrad](http://www.colorado.edu/classics/undergrad).

**Graduate Degree Programs**

**Master's Degree**

Candidates may choose to emphasize Greek, Latin, classical art and archaeology, classical antiquity, or the teaching of Latin (MAT).

It is expected that students opting for the teaching of Latin either have achieved accreditation at the secondary level or are planning to do so through the School of Education. The MA degree alone does not satisfy the state requirements for certification.

**Degree Requirements.** Candidates for the MA degree in Latin or Greek are required to complete at least six graduate level courses in Greek and/or Latin and to pass a written examination in translation of the major language. Students intending to pursue the PhD in classics are strongly advised to develop proficiency in both Latin and Greek, and to acquire a reading knowledge of German, French, or Italian.

Candidates for the MA degree in Classical Art and Archaeology are required to complete at least two graduate-level courses in Greek and/or Latin and five graduate-level courses in ancient and/or medieval art and archaeology (of which at least one must be at the 5000-level or above [not 4000/5000] and one must be a preapproved nonclassical course). In addition, they must pass written examinations on Greek and Roman art and archaeology. Students intending to pursue the PhD in classical archaeology are strongly recommended to develop proficiency in both Latin and Greek and to acquire a reading knowledge of German, French, or Italian. With the approval of the associate chair for Graduate Studies, graduate-level classes in Greek or Latin may be substituted for classical archaeology or history.

Candidates for the MA degree with emphasis on classical antiquity are required to complete at least two graduate-level courses in Greek and/or Latin and must pass a written examination in two of the following fields: history, art and archaeology, religion and mythology, philosophy and political theory, and Greek or Latin translation.

Candidates for the MA Plan I (24–27 hours of course work at the 5000-level or above, plus 3–6 credit hours of thesis) take an oral comprehensive examination in defense of the thesis. Candidates for the MA Plan II (30 credit hours at the 5000-level or above, without thesis) must have departmental approval and pass an oral comprehensive examination covering their course work and reading lists for their exams.

Candidates for the MA degree with emphasis on the teaching of Latin must pass a written examination in Latin translation and an oral comprehensive examination on teaching methods and their own Latin teaching project. Thirty hours of course work, including one Latin workshop and a special project, are required. Plan I is not offered for the MA degree with emphasis on teaching.

### *Doctoral Degree*

Candidates for the PhD in classics must meet the following requirements:

1. A minimum of 42 hours of course work at the 5000 level or above (excluding thesis and accelerated courses). Course work completed in the MA program at the University of Colorado, or up to 21 hours of graduate credit transferred from another institution, may be applied toward this requirement. Courses should be distributed as follows:
  - a. Four 7000-level graduate seminars (at least one each in Greek and Latin).
  - b. Two courses in ancient history and/or classical archaeology.
  - c. One course in either Greek or Latin prose composition.
  - d. Two courses in special fields such as epigraphy, law, linguistics, literary theory, medieval studies, palaeography, papyrology, philosophy, or religion, as approved by the associate chair for graduate studies.
2. A minimum of 30 hours of doctoral dissertation credit with no more than 10 of these hours in any one semester. No more than 10 dissertation hours may be taken preceding the semester of taking the Oral Comprehensive Examination. Up to 10 hours may be taken during the semester in which the student passes the comprehensive examination.
3. A reading knowledge of German and one other modern foreign language (normally Italian or French). Proficiency is tested by a one-hour written translation test using a dictionary. Students may take a Foreign Language Exam at any

time by arrangement with the associate chair for graduate studies. Students are encouraged to pass both modern language exams before the end of the third semester and required to do so before the end of the fourth semester in the PhD program.

4. Greek and Latin Translation Exams. Two examinations of three hours of written translation in Greek and Latin. Each examination will consist of two out of three prose passages and two out of three verse passages for a total of approximately 120 lines. There will be two administrations of each exam per year, in the fall and spring. Students are encouraged to pass both exams by the end of the second semester and required to pass them by the end of the second year in the PhD program.
5. Special Author Exams. Two oral examinations of 1.5 hours each on two ancient authors, one Greek and one Latin.
6. Oral Comprehensive Examination. Two hours on Greek and Latin Literature. Students are encouraged to complete this exam early in the fifth semester and must have completed it by the end of the sixth semester in the PhD program.
7. Dissertation Prospectus. To be circulated to the Dissertation Advisory Committee for approval. Students are encouraged to complete the prospectus during the fifth semester and must complete it during the seventh semester in the PhD program.
8. Dissertation. To be completed by the end of the tenth semester in the PhD program.
9. Final Examination (upon submission of dissertation). Two hours of oral defense of the dissertation.

### **Cognitive Science Studies**

The Institute of Cognitive Science offers academic programs for both graduate and undergraduate students. Cognitive science is the study of human knowledge, of which one aspect is the study of how knowledge is acquired, stored, and represented in the mind, including the mind's underlying biological mechanisms. Another aspect of cognitive science concerns how knowledge is understood, remembered, communicated, and used in the performance of activities, including the acquisition and application of skills and information. This latter aspect provides the practical applications of cognitive science, and thereby ensures a demand for graduates in both academic and industrial markets. Training for graduates in cognitive science prepares students admirably for many of the fields that are targeted as the major growth fields of the 21st century: telecommunications, information processing, medical analysis, data retrieval, education, and multimedia services.

CU graduate students can apply to a certificate program or a combined PhD in conjunction with their home department PhD program. The combined PhD program allows for interdisciplinary study that adds cognitive science or cognitive neuroscience to the PhD program in the student's home department. There are currently two graduate certificate programs: one has a general science focus, the other focuses on human language technology. Undergraduates may also apply for a certificate program. The Cognitive Science Academic Certificate Programs are interdisciplinary programs for majors in the Departments of Psychology; Philosophy; Linguistics; Education; Speech, Language, and Hearing Sciences; Computer Science; and Architecture, Planning and Design.

The Undergraduate program includes courses in the six core departments, with basic courses and two of four possible advanced skill sequences of courses. For more information, either visit [ICS.colorado.edu](http://ICS.colorado.edu) or call Donna Caccamise at 303-735-3602.

## Communication

*Degrees* .....BA, MA, PhD

The bachelor of arts in communication provides analytic work from both humanistic and social-scientific perspectives, and practical work to improve communication performance in various kinds of situations.

The undergraduate degree in communication emphasizes knowledge and awareness of:

- the history and development of communication as an object of scholarly study, including both the humanistic and social-scientific traditions;
- the basic contexts in which communication is enacted (e.g., interpersonal, group, organizational, and public contexts);
- the various processes of interaction within these contexts;
- the basic methods of investigating questions about communication;
- the ethical issues and responsibilities of communication practice;
- the diversity of communication styles associated with gender and cultural differences; and
- the uses and implications of communication technology.

In addition, students completing the degree in communication are expected to acquire the ability and skills to:

- express ideas in an informed, coherent, and effective manner, particularly the ability to articulate and develop a sustained argument, both orally and in writing;
- analyze, criticize, and evaluate messages and interactions in a variety of practical contexts, both orally and in writing; and
- adapt messages and negotiate interactions responsibly in diverse and changing situations.

Graduate study in communication examines problems of human interaction and relationship, participation and collaboration, and deliberation, dialogue, and decision making in personal relationships, workplace and institutional contexts, and community and public life. The master's program provides students with knowledge of selected bodies of communication scholarship and develops their skills in analyzing complex communication situations for a range of professional positions in business, nonprofit institutions, and other types of community groups, and for doctoral study in communication. The doctoral program provides students with opportunities to conduct theoretically grounded, practically useful research that crosses traditional academic boundaries and that prepares them to assume faculty positions in universities, as well as in research and training programs in business, government, and social service agencies.

### Precommunication (PRCM) Major

Students admitted to CU-Boulder beginning in summer 2003 who intend to pursue a COMM major typically enroll as PRCM majors, and must complete each of the following courses with a grade of C- or higher in each course and a GPA average of 2.00 across the following three courses:

COMM 1210 Perspectives on Human Communication  
COMM 1300 Public Speaking  
COMM 1600 Group Interaction

Although space in these courses cannot be guaranteed, PRCM majors will have priority registration for these courses. Students who complete these courses with the minimum grade of C- or higher in each course and a GPA average of 2.00 across the three courses may apply for admission to the COMM major but are not guaranteed admission.

The following rules apply only to students who have matriculated into CU-Boulder as of summer 2003.

### Freshmen

New freshmen who desire to pursue a COMM major will be admitted as PRCM majors and will be required to meet the criteria for admission to the major by the time they achieve 60 credits.

### Transfer Students

Freshman transfer students from other universities who enter CU-Boulder with freshman standing (29.9 credit hours or fewer completed) who wish to enter the COMM major will be admitted as PRCM majors and will be required to meet the same criteria as new freshmen for admission to the major.

**Advanced Standing Transfer Students:** Transfer students from other universities who enter CU-Boulder with sophomore standing or above (30 hours or more of transfer credit) will be admitted to the PRCM major and will have a maximum of 30 credit hours after transfer to CU-Boulder to meet the criteria for admission to the major. The department will determine the equivalency of transfer courses to courses required for admission to the major.

### Intra-University Transfers (IUTs)

IUTs: Students from other schools and colleges on the Boulder campus who are in their freshman year and who have not yet met the criteria to enter the COMM major may IUT into the PRCM major provided that they meet the IUT requirements for entry to the College of Arts and Sciences.

**IUTs with Advanced Standing:** Students from other schools and colleges on the Boulder campus with sophomore standing or above (30 hours or more completed) may be admitted to the PRCM major provided that they meet the criteria for IUT into the College of Arts and Sciences. IUTs with sophomore standing or above will have a maximum of 30 credit hours after admission to arts and sciences to meet the criteria for admission to the major.

### Second Undergraduate Degrees

Students requesting admission to the COMM major for the purpose of completing a second undergraduate degree will be admitted to the PRCM major and will be required to follow the same process for admission to the major as new freshmen.

### Change of Major or Second Major

Students from other arts and sciences majors, including readmitted students, who are in their freshman year and who have not yet met the criteria to enter the COMM major can change their major to the PRCM major or can add the PRCM major to their existing major if they have a cumulative GPA of 2.00 or above.

Students from other arts and sciences majors who are beyond their freshman year, including readmitted students, must meet all criteria and must apply and be directly admitted to the COMM major. They cannot change their major to the PRCM major.

**Distributed Studies**

A COMM major will not be eligible to be included as an “area option” in the Distributed Studies major except by special permission of the communication department.

**Applying for Admission to the COMM Major**

Students who have completed the PRCM requirements may apply for admission to the COMM major through the following procedures (note that requirement changes have been made effective fall 2006):

- Except as noted above, students must apply in or before the semester in which they will have completed 60 credit hours.
- Applications must include a completed form and a 500-word essay. See the department’s website for the application form and guidelines for the essay ([comm.colorado.edu](http://comm.colorado.edu)).
- Applications must be received by the end of the third week of classes in the fall and spring semesters. A faculty committee chaired by the associate chair of undergraduate studies in the department will review applications and make decisions. Applicants will be ranked according to the following criteria: GPA in the three PRCM required courses, cumulative GPA, and quality of the application essay.
- Each PRCM course may be retaken only once. If a PRCM course is retaken, the grade from the second attempt will be used in calculating the PRCM GPA. (Students should note that a minimum GPA of 2.00 is required *across* the three PRCM courses; a grade of C- is worth only 1.7 points so it must be offset by a higher grade in another PRCM course.)
- Students denied admission may appeal in writing to the associate chair of undergraduate studies in the department. Only appeals based on procedural or clerical error will be considered. Students may not appeal based on their disagreement with the decision.
- Students who have been denied admission may reapply once up until they achieve 60 credits. Once a student who has applied and been denied admission achieves 60 credits, the student is no longer eligible to reapply.

**Bachelor’s Degree Program**

Effective fall 2009, majors must complete a minimum of 33 hours of course work in communication (24 hours above and beyond COMM 1210, 1300, and 1600), 18 of which must be upper division (3000 level or higher). Only courses with grades of C- or better count toward the major, and the overall major GPA must be 2.00 (a C- is 1.70).

<i>Required Courses</i>	<i>Semester Hours</i>
COMM 1210 Perspectives on Human Communication . . . . .	3
COMM 1300 Public Speaking. . . . .	3
COMM 1600 Group Interaction. . . . .	3
COMM 3210 Human Communication Theory. . . . .	3
COMM 3300 Rhetorical Foundations of Communication . . . . .	3
One methods course: COMM 3740, 3750, or 3760 . . . . .	3
One senior seminar: COMM 4220, 4300, 4400, 4510, or 4600 . . . . .	3
Two of the following:	
COMM 2360 Campaigns and Revolutions . . . . .	3
COMM 2400 Communication and Society. . . . .	3
COMM 2500 Interpersonal Communication. . . . .	3
COMM 2600 Organizational Communication . . . . .	3

Two additional upper-division electives (3000- or 4000-level courses):  
 4000-level courses may be taken twice (only twice) with different topics. 6

*Up to 8 credit hours of independent study and 6 hours of internships may be taken. These are upper-division elective hours but do not count toward major requirements. Eligible students interested in graduating with department honors should contact the department’s honors coordinator as soon as possible.*

The department encourages its majors to take related courses in: business; English; ethnic studies; journalism and mass communication; linguistics; philosophy; political science; sociology; speech, language, and hearing sciences; and theatre and dance.

Students who wish to major in communication should meet with a department advisor, where they will be advised of any changes in this list of requirements.

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in communication, students should meet the following requirements:

- Students should declare the precommunication major by the time they acquire 15 hours of credit.
- Students must consult with an advisor assigned to the communication department to determine adequate progress toward admission into the major.
- Students should be accepted into the major by the time they acquire 60 hours of credit.
- Students who are accepted as majors must consult with their major advisor to determine adequate progress toward completion of the major requirements within the timeframe of the four-year guarantee.
- Majors should register at designated times.

**Graduate Degree Program**

The department offers programs of study leading to the MA and PhD in communication. Interested students should contact the department for current admission and degree requirements, or see [comm.colorado.edu](http://comm.colorado.edu).

**Comparative Literature Program**

*Degrees*..... MA, PhD

The Comparative Literature Program enables students to study the production, reception, and interpretation of written texts and related media from a comprehensive perspective involving at least two national literatures. Comparative literature has long crossed national linguistic frontiers. The discipline today questions the very basis of such boundaries, exploring the construction of national literatures, languages, and traditions and, insofar as this can be read in and out of verbal and other media, of nations and national consciousness itself. Extending its reflections on limits still further and in dialogue with other disciplines, the interpretive perspectives of comparative literature are not only crossdisciplinary, multi-media, and multilingual, but global. The aim is to analyze the world’s cultures both as expressions of the various interdependent histories that have framed them, and as manifestations of the multifacetedness inscribed in the different forms by which human beings shape and communicate their experience. These forms can range from a single literary genre, period, movement, or tradition to larger concepts and constructs such as gender, sexuality, theory, or culture. Areas of analysis may also include authorship and the literary work, literacy, genre, literary history, and the canon. Students wishing to pursue graduate work in comparative literature should read the guidelines for the MA and PhD degrees in this field. These are available at [complit.colorado.edu](http://complit.colorado.edu).

### Master's Degree

**Prerequisites.** In addition to an undergraduate major in a relevant field, students applying for admission to the MA program in comparative literature should have completed three years of college-level study or its equivalent in one foreign language. Students are also encouraged to begin study of a second foreign language before applying.

**Course Work Requirements.** Candidates for the MA in comparative literature must take a total of 10 courses (representing 30 credit hours). Half the required credit hours are in courses offered by the Comparative Literature Program. At least 9 hours are in the department of the student's primary literature, and an additional 6 hours are in the department of the secondary literature.

**Examinations and Thesis.** Candidates for the MA in comparative literature must submit and defend orally a master's thesis.

### Doctoral Degree

**Prerequisites.** Students are accepted for doctoral study in comparative literature directly from the BA or after completion of an MA in comparative literature, a national literature, or a related discipline. All students seeking admission to doctoral study must show evidence of advanced knowledge in one foreign language (ability to take fourth-year college literature courses in this language) and intermediate knowledge (at least two years of course work at the college level) of a second foreign language.

**Course Work Requirements.** Students who receive their MA in comparative literature from CU-Boulder are required to take a minimum of 48 hours of graduate course work, including 30 hours completed during the preparation for the MA and 18 hours completed during the first year of doctoral studies. Students receiving the MA from another institution or in another subject are required to take a minimum of 36 credit hours (12 courses) for the degree. Students who enter the PhD program directly from a BA program are required to take a minimum of 48 hours of graduate course work.

**Examinations and Course Work.** All PhD candidates take a comprehensive examination and a final examination. The final examination is an oral defense of the doctoral dissertation, and is conducted by the student's advisory committee after all other requirements for the PhD have been completed.

## Distributed Studies Program

*Degree* ..... BA

Admission to the distributed studies track requires completion of 60 credits or more and permission from the dean's office. The distributed studies track is intended for students who have accumulated a significant number of credit hours toward the completion of one or more majors and are not eligible to continue in those majors.

An individually structured track also is available in the distributed studies program. Students pursuing the individually structured track must write and defend a thesis based on original scholarly or creative work.

For more information, contact the College of Arts and Sciences Academic Advising Center in Woodbury 109.

## Ecology and Evolutionary Biology

*Degrees* ..... BA, MA, PhD

Ecology is concerned with describing and understanding the abundance, distribution, and interactions of organisms. Evolutionary biology provides a unifying conceptual framework for all of biology, including the characteristics of organisms and biological diversity. Ecology and evolutionary biology are fundamental, broad, interrelated, and interdisciplinary areas of scientific inquiry. Study in both areas is necessary for understanding the complex biological issues of today, and for solving some of the world's most demanding problems. Students of EBIO apply the scientific method to issues in ecology and evolution, with an emphasis on critical evaluation of the literature; generating and testing hypotheses; designing and carrying out experiments to test predictions; and articulating, in oral or written form, the results of investigations.

In the light of the broad importance of ecology and evolution for understanding biology, the undergraduate EBIO degree emphasizes knowledge of:

- The ecology of organisms, populations, and communities
  - The distribution and function of terrestrial, freshwater, and marine ecosystems
  - Principles and patterns of evolution, including natural selection and the history of life on Earth
  - Comparative, systematic, evolutionary, and environmental aspects of botany, microbiology, and zoology
  - Adaptation of organisms to the physical and biotic environment
  - Animal behavior
  - Molecular evolution and population genetics
  - Developmental biology and the evolution of development
  - Conservation biology
  - The relevance of mathematics, chemistry, and physics to biology
  - The development of biological thought
- EBIO majors include:

- students who have strong and compelling interests in the natural world and who are interested in making a difference
- students interested in pursuing advanced graduate degrees in science, especially biology
- students intending to work in the areas of natural resources management, environmental consulting, environmental law, environmental science, science teaching and scientific journalism, among other professions
- students with a passion to make a difference in the lives of others by improving their physical and mental health
- students with an interest in studying biology, from the molecular to ecosystem levels
- students fascinated with the complexity and diversity of nature

A bachelor of arts degree in EBIO provides excellent training, education, and experience for admission and success in graduate or medical school

- because the educational program emphasizes a broad-based training in the physical, chemical, and biological sciences
- because ecology and evolution are subjects of central importance for understanding our place in nature



- because “nothing in biology makes sense except in the light of evolution” (T. Dobzhansky)
- because of the department’s strong commitment to providing excellent educational and research opportunities for students

## Bachelor’s Degree Program

Students in EBIO gain a well-rounded education in the sciences and mathematics, with an emphasis in ecology and evolutionary biology. In addition to the general College of Arts and Sciences requirements, students in EBIO must complete 15 credits selected from chemistry, physics, and mathematics, plus a statistics course and 38 hours of course work in EBIO. Up to 12 credit hours of courses taken in other departments may be counted toward the 38 credit hours required for the EBIO major. A list of acceptable courses can be obtained from the EBIO Undergraduate Advising and Resource Center. All required courses must be completed with a grade of C- or better. Students with scores of 4 or 5 on the AP biology test receive 8 hours of credit and are exempt from the general biology sequence (EBIO 1210 and 1220 General Biology 1 and 2, and EBIO 1230 and 1240 General Biology Lab 1 and 2). Students who score in the 66th percentile or higher on the CLEP test in biology receive 6 hours of credit and are exempt from EBIO 1210 and EBIO 1220. EBIO majors with transfer credit in biology from other institutions or advanced placement credits must consult with the EBIO Undergraduate Advising and Resource Center. Transfer students must complete at least 12 upper-division (3000-level or above) EBIO courses on the Boulder campus.

### Required Courses Semester Hours

Biology sequence (EBIO 1210 and 1220 General Biology 1 and 2, and EBIO 1230 and 1240 General Biology Lab 1 and 2) . . . . .	8
EBIO 2040 Principles of Ecology . . . . .	4
EBIO 2070 Genetics: Molecules to Populations . . . . .	4
EBIO 3080 Evolutionary Biology . . . . .	4
One EBIO laboratory or field course, 3000 level or above. Possible choices include:	
EBIO 3170/3175 Arctic and Alpine Ecology	
EBIO 3240 Animal Behavior	
EBIO 3400 Microbiology	
EBIO 3540 Functional Plant Biology	
EBIO 3630 Parasitology	
EBIO 3770 Animal Diversity: Vertebrates	
EBIO 3850 Animal Diversity: Invertebrates	
EBIO 4100 Mountain Research Station	
EBIO 4500 Plant Biodiversity and Evolution	
EBIO 4520 Plant Systematics	
EBIO 4510 Plant Anatomy and Development	
EBIO 4660 Insect Biology	
EBIO 4750 Ornithology	
EBIO 4760 Mammalogy	
EBIO 4000-level or above (at least 6 credits). * Possible choices include:	
EBIO 4020 Stream Biology	
EBIO 4030 Limnology	
EBIO 4060 Landscape Biology	
EBIO 4140 Plant Ecology	
EBIO 4100, 4110, or 4120 Advanced Ecology	
EBIO 4160 Introduction to Biogeochemistry	
EBIO 4175 Ecosystem Management of Public Lands	
EBIO 4180 Ecological Perspectives on Global Change	
EBIO 4290 Molecular Systematics and Evolution	
EBIO 4350 Biological Field Studies	
EBIO 4410 Biometry	
EBIO 4570 Advanced Plant Physiology	
EBIO 4630 Field Techniques	

EBIO 4660 Insect Biology	
EBIO 4740 Biology of Amphibians and Reptiles	
EBIO 4750 Ornithology	
EBIO 4760 Mammalogy	
EBIO 4800 Critical Thinking	
EBIO 4840, 4870 Independent Study/Research	
EBIO electives . . . . .	5-6
<b>Statistics:</b> MATH 2510, MATH 2520, IPHY 2800, PSYC 3101, or EBIO 4410 (of these, only EBIO 4410 counts toward the 38 hours of EBIO credit required for the major.)	

\* These 6 hours must be taken in the EBIO department on the Boulder campus, may include critical thinking courses, and may include a maximum of 3 hours of independent study or independent research.

### Ancillary Courses

15 hours selected from the following:  
 Chemistry: CHEM 1071, 1113/1114, 1133/1134 or CHEM 1151 and 1171  
 Physics: PHYS 1110, 2010, 2020, or PHYS 1120 and 1140  
 Math: MATH 1300, 1310, 2300, or MATH 2520 or equivalent

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in ecology and evolutionary biology, students must meet the following requirements:

- Declare the EBIO major and begin course work in the major in the first semester of the freshman year.
- Sign up during the first semester with the departmental undergraduate services coordinator as a participant in the guarantee program.
- Complete additional requirements for the four-year guarantee that are described on a handout available in the EBIO Undergraduate Advising and Resource Center.

### Minor Program

A minor is offered in ecology and evolutionary biology. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

### Concurrent BA/MA Program

A combined BA and MA degree with thesis is offered for the highly motivated undergraduate major who is interested in completing a bachelor and master’s degree within five years. Applications for the BA/MA degree are considered on a competitive basis. Freshmen, sophomores, and juniors are eligible. Applicants must have an overall GPA of 3.00 or higher in the EBIO major and the support of a faculty research advisor. Applications are available from the EBIO graduate coordinator, and are due on October 15 and March 15.

Candidates for this degree must complete all college core requirements by the end of the senior year. To be awarded BA and MA degrees, students must maintain a GPA of 3.00 or better and complete at least 144 credit hours. The degree requires 24 hours of graduate credit at the 5000-level or above and 4–6 hours of thesis credit. In addition to a thesis based on original research, the candidate is required to take a comprehensive examination in three subject areas by the end of the senior year. The final examination consists of a thesis defense to the thesis committee; it should be scheduled by the end of the fifth year.

Students interested in this degree are encouraged to consult with the director of the program early in their undergraduate career. The department considers this a terminal degree, and no financial support is available from the department for students enrolled in this program.

## Graduate Degree Programs

The Department of Ecology and Evolutionary Biology offers degree programs leading to the MA and PhD in a wide range of areas of biological inquiry, as generally described above in the description of the undergraduate program. Modern laboratory facilities for graduate study are in the Ramaley biology building. In addition, the department has strong ties with the University Museum, the Institute of Arctic and Alpine Research (INSTAAR), the Institute of Behavioral Genetics (IBG), the Cooperative Institute for Research in Environmental Sciences (CIRES), the Environmental Studies Program (ENVS), and the Departments of Integrative Physiology, Geology, Geography, Anthropology, and Molecular, Cellular, and Developmental Biology. INSTAAR operates the Mountain Research Station, an alpine field laboratory 25 miles from campus. Graduate research support is available in the form of fellowships, teaching assistantships, and research assistantships.

### Graduate Admission

Admission information may be obtained from the departmental office or from the CU-Boulder web page. Completed applications are due in the departmental office by December 31 for consideration for fall semester admission. A complete application includes a statement of intent, letters of recommendation, official transcripts, and GRE scores. Applications for spring semester admission are not accepted. Students are required to have a bachelor's degree in biology or an equivalent. Students admitted without a sufficient background in chemistry, physics, or mathematics are expected to make up those deficiencies during their first year of graduate study.

### The MA I Program

A master's degree with thesis is offered for students interested in continuing their training as professional biologists. For some students the MA I provides a basis for work on a PhD at the University of Colorado or at another institution, although the MA is not required for admission to the PhD program. Prospective students are urged to consult with faculty advisors before December 31 to see whether application for the MA I or PhD program is appropriate. Applications for the MA I program are considered on a competitive basis; the department only admits students for whom financial support is available. Thirty hours of course work are required for the degree, at least 24 of which must be at the 5000 level or above, including 4–6 hours of thesis credit. The thesis topic is presented to the thesis committee as a written research proposal. The MA I final examination consists of the thesis defense; it should be scheduled within two years for full-time students.

### The MA II Program

A non-thesis master's degree program is offered for students who are interested in obtaining a greater knowledge of ecology and evolutionary biology but who are not interested in degree work beyond the MA. This program is suitable for secondary school teachers and others whose career choices do not require a research thesis. A faculty sponsor is required before admission can be granted; applicants are encouraged to communicate with potential sponsors before December 31. Financial support is not guaranteed for MA II students. Thirty credit hours of course work are required for the degree, at least 24 of which must be at the 5000 level or above, including 4 hours of independent research leading to a paper to be presented to the faculty sponsor.

A final oral exam may be required by the student's MAII faculty advisory committee.

### Doctoral Program

The PhD is a research degree, involving the production of a major piece of original research (the dissertation). Most recipients of the PhD from EBIO go on to teach and conduct research in a university setting, or to do research and pursue leadership roles in private or governmental institutions. Applicants are encouraged to communicate directly with potential thesis advisors and visit the department before completing the application. Applications are considered on a competitive basis and financial support in the form of fellowships or assistantships usually is made available. Students are expected to form an advisory committee of five faculty members (including one from outside EBIO) soon after beginning their studies. This committee aids the student in designing a research program and in making choices concerning course work. The PhD comprehensive exam is administered by the student's dissertation committee and must be taken within the first five semesters of degree work. It consists of a written research proposal on the dissertation topic, a formal presentation summarizing the student's research progress, and an oral examination centered on the student's research. Upon completion of the dissertation, the student will be given a final examination administered by the dissertation committee.

A total of 30 hours of course work must be taken, although independent study credit may be included in this total. A total of 38 hours of PhD dissertation credits must also be taken. PhD students are required to teach at least one year, generally by serving as a departmental teaching assistant.

## Economics

*Degrees*..... BA, MA, PhD

The undergraduate degree in economics emphasizes knowledge and awareness of:

- the conditions for efficiency in free market production and exchange;
- contemporary theories concerning economic growth, inflation, unemployment, distribution of income, and international environment;
- specialized fields of economics, such as international economics and finance, natural resources and environment, the economics of gender and discrimination, and public economics;
- the descriptive statistics commonly used by economists; and
- the institutional characteristics of the U.S. economy, and how these differ from those in other economies.

In addition, students completing the degree in economics are expected to acquire the ability and skills to:

- apply the tools of microeconomic theory to reach sound conclusions for simple economic problems;
- follow arguments concerning macroeconomic theory, to distinguish between sound and fallacious reasoning, and understand how differences in policy prescription may arise;
- perform statistical analysis such as multiple regression and understand similar analyses performed by others; and
- communicate economic reasoning in writing, understand similar writing by others, and appreciate the diversity of views that may reasonably exist about economic problems.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Total Economics Credits</b> . . . . .	<b>32–33</b>
ECON 1000 Introduction to Economics or ECON 2010 and 2020 Principles of Microeconomics and Macroeconomics. . . . .	4–8
ECON 1078 and 1088, Math Tools for Economists I and II, or MATH 1071 and 1081 or MATH 1071 and MATH 1300 Analytic Geometry and Calculus I or Mathematics at or above the level of MATH 1300 (or APPM 1350) plus any one mathematics course above the level of MATH 1300. . . . .	6–8
ECON 3070 Intermediate Microeconomic Theory and ECON 3080 Intermediate Macroeconomic Theory . . . . .	6
ECON 3818 Introduction to Statistics with Computer Applications . . . . .	4
ECON 4818 Introduction to Econometrics or ECON 4848 Applied Econometrics. . . . .	3
Electives in upper-division ECON courses (15 credit hours of upper-division ECON courses if ECON 1000 is substituted for ECON 2010 and 2020) . . . . .	12

*Note: Transfer students majoring in economics must complete at least 12 credit hours of upper-division economics courses at CU-Boulder.*

### Graduating in Four Years

Consult the “Four-Year Guarantee Requirements” for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in economics, students should meet the following requirements:

Declare economics as a major by the beginning of the second semester.

Complete ECON 2010 and 2020 or ECON 1000 and all mathematics requirements by the end of the fourth semester.

Complete ECON 3070, 3080, and 3818, as well as 4818 or 4848 by the end of the sixth semester.

Complete 12 credit hours (15 if ECON 1000 is substituted for ECON 2010 and 2020) of additional upper-division economics credit by the end of the eighth semester.

### Special Emphasis Options

The Economics Department offers four tracks for students who have a relatively high GPA and want to focus their upper-division course work in a specific area of interest. Interested students must have completed at least 6 hours of economics course work at CU and have at least a 3.00 GPA in economics work completed at CU. Requirements are listed on the economics website at [www.colorado.edu/economics](http://www.colorado.edu/economics).

#### Business Emphasis

The business emphasis is designed for students interested in sampling the business core courses. This option allows students to supplement their economics major with core business skills in areas of accounting, finance, marketing, and management. This option may be of interest to students planning careers in business or intending to pursue graduate studies in business.

#### International Emphasis

The international emphasis is designed for students who have an interest in courses with an international perspective both within economics and outside the department. Courses in international trade and finance are combined with selections of international courses in related social science disciplines. This program may be of particular interest to students seeking careers in international business, international organizations, nongovernmental organizations, and government agencies.

#### Public Economics Emphasis

The public economics emphasis is designed for students who have an interest in taking courses with a public policy perspective both within economics and outside the department. Courses in public economics are combined with selections of policy oriented courses from various social sciences. This emphasis is recommended for students with interests in public policy seeking careers in local, state, national, or international agencies.

#### Quantitative Emphasis

The quantitative emphasis is designed for well-qualified majors with an interest in either theoretical or applied mathematics. Economics courses in quantitative methods are combined with courses from the Department of Mathematics and the Department of Applied Mathematics. This program may be of interest to students planning to pursue graduate studies in economics or those seeking a career in applied quantitative research.

#### Minor Program

A minor is offered in economics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

#### Economics Honors Program

The honors program in economics provides an opportunity for highly motivated majors to undertake individualized research and to graduate with honors (cum laude, magna cum laude, summa cum laude) in economics. Economics majors with senior standing and both economics and overall GPAs of 3.40 or better are eligible to participate. Participants enroll in the economics honors seminars, which provide instruction in research methodology essential to the preparation of the honors thesis. Students interested in the economics honors program should contact the departmental honors advisor during their junior year.

#### Economics Internship Program

This program offers course credit while providing students the opportunity to integrate theoretical concepts of economics with practical experience in economics-related institutions. Juniors and seniors interested in the program should contact the departmental internship coordinator.

## Graduate Degree Programs

### Master's Degree

The Department of Economics does not currently offer a stand-alone MA degree program, although students enrolled in our PhD program will earn their MA degree as they progress toward their doctorate.

### Doctoral Degree

**Admission.** An applicant for admission as a regular degree student must:

1. Hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree and equivalent to the degree given at this university. The undergraduate grade point average must be at least 2.75 (2.00=C).
2. Have completed intermediate microeconomic and macroeconomic theory courses, 6 semester hours of calculus at the university level or equivalent, and statistics.

- Submit Graduate Record Examination (GRE) scores for aptitude (verbal and quantitative). International applicants must also submit a TOEFL score.
- Arrange for the submission of three letters of recommendation.

Graduate study in economics is quantitative and analytical. Students should be comfortable with basic calculus (derivatives and integration), linear algebra, matrix algebra, and basic statistics.

The university deadline for international applications is December 1 for the following fall semester. The department encourages international applicants to comply with this deadline. Late applications may be considered. However, they may be at a disadvantage with respect to the award of financial aid. United States applicants who wish to be considered for financial assistance should apply by February 1. Students must begin the program in a fall semester.

**Degree Requirements.** Full-time students are expected to complete all requirements for the PhD degree within five years of entering the program (the maximum time allowed by the Graduate School is six years). The schedule of required courses below is centered on this expectation. Failure to make timely and satisfactory progress toward the degree may result in loss of financial assistance or dismissal from the program.

#### Course Requirements

- Prior to beginning the program, students must demonstrate an acceptable degree of competence in differential and integral calculus and optimization techniques. (This requirement is in addition to the six hours of calculus required to apply to the program.) Such competence is normally demonstrated by taking ECON 7800 (an intensive, two-week preparatory course offered immediately prior to each fall semester) and passing its final examination with a grade of B- or better. No credit is offered for this course.

Other methods by which the required competence may be demonstrated are:

- Obtain a letter from the Director of Graduate Studies (DGS) confirming that the student has had sufficient mathematical preparation in prior studies;
- Pass the final examination in ECON 7800 at a level of B- without taking the course; or
- Pass a course which is substantially equivalent to ECON 7800 at another accredited graduate institution.

Students who fail the examination in ECON 7800 will be given a second opportunity to pass an equivalent examination two weeks later. Students who fail this examination on the second attempt must enter into extensive consultation with the DGS.

- There are seven core courses in the PhD program: ECON 7010, 7020, 7030, 7040, 7050, 7818, and 7828. Course requirements beyond the core courses include:

Seven elective courses at the 8000 level. Basic fields of specialization are econometrics, economic development, economic history, industrial organization, international trade and finance, labor and human resources, natural resources and environmental economics, public economics, and urban and regional economics. Ordinarily, a student would take two elective courses in a basic field of specialization in preparation for a dissertation.

6 credit hours in a research colloquium.

At least 30 hours of dissertation credit.

- At least four of the core courses must be taken on the Boulder campus. Courses transferred for credit must be approved by

the DGS. After entry into the PhD program, all remaining courses must be taken on the Boulder campus.

- All courses for PhD credit taken on the Boulder campus must be passed with a grade of B- or better. A student who receives a grade of C+ or lower in a core course must retake that course the following academic year.
- No more than 12 credit hours (exclusive of dissertation credit) from a single faculty member may be counted toward PhD requirements. Independent study is allowed only to satisfy elective requirements. No more than 6 credit hours of independent study may be applied to the PhD degree and no more than 3 credit hours of independent study may be taken from a single faculty member. Students who wish to take independent study must apply to the Graduate Curriculum and Review Committee (GCRC) in order to do so. In consultation with the DGS, students may choose to take up to two graduate offerings in other departments as elective courses.
- Course requirements in the first and second years include:

#### First Year

##### Fall Semester

ECON 7010 Microeconomic Theory 1

ECON 7020 Macroeconomic Theory 1

ECON 7818 Mathematical Statistics for Economists

##### Spring Semester

ECON 7030 Microeconomic Theory 2

ECON 7040 Macroeconomic Theory 2

ECON 7828 Econometrics

#### Second Year

##### Fall Semester

ECON 7050 Advanced Economic Theory

Elective course

Elective course

##### Spring Semester

Elective course

Elective course

Elective course

- Course requirements in the third year include
  - ECON 8209 (fall) and ECON 8219 (spring), which constitute the third-year research colloquium
  - Remaining elective course(s)
  - Dissertation research, if practicable.
- Course requirements in the fourth year consist of relevant dissertation credit hours.

**Preliminary Examinations.** Written preliminary examinations in microeconomic theory, macroeconomic theory, and econometrics must be taken in the August examination period following the successful completion of the core courses in these areas. Under most circumstances this period would be prior to the second year. An examination attempted and failed must be taken again and passed in the next examination period. A second failure results in dismissal from the program, subject to appeal under extraordinary circumstances to the GCRC. In no case are attempts beyond the third granted.

Students who have failed any of the core courses are ineligible to take the preliminary examination in the area of failure. These students must retake the failed course(s) in the following year and attempt the relevant preliminary examination in the first scheduled examination period thereafter.

Students must pass all preliminary examinations within two-and-one-half years of beginning the PhD program.

**MA Degree.** An MA degree will be awarded to students who have successfully completed all core courses in the PhD pro-

gram, completed 30 hours of graduate credit, and performed satisfactorily on the PhD preliminary examinations.

**Third-Year Research Colloquium.** Each third-year student is required to register for 3 credit hours per semester in the research colloquium, which will meet weekly under the direction of a faculty member. The purpose of the colloquium is to provide students the opportunity and guidance to complete the required third-year paper and to facilitate progress toward the dissertation stage. Meetings in the fall semester allow preliminary discussions of the research and lectures in research methodology, data sources, and the like. In the spring semester each student presents work in progress in the colloquium.

Under some circumstances, students may delay taking this colloquium until the fourth year with the approval of the DGS.

**Comprehensive Examinations.** Students must take an oral comprehensive examination before admission to candidacy. This examination may occur either at the time of the student's research presentation in ECON 8219 or at a later date and will encompass the materials in the presentation and all relevant course work completed by the candidate. At least two faculty members from the student's basic dissertation committee, as well as three additional faculty members, must certify the acceptability of the performance on the oral examination. Students who fail this comprehensive examination will be given a second chance during the following fall semester. For those students for whom the presentation in ECON 8219 does not serve as the oral comprehensive examination, a separate oral examination must be scheduled before admission to candidacy.

**Admission to Candidacy and Dissertation Requirements.** Students are formally admitted to candidacy for the PhD degree after completing all course requirements and all preliminary and comprehensive examinations and after earning four semesters of residency (see the front section of this catalog for details). After admission to candidacy, students must register each fall and spring semester for dissertation credit (ECON 8999) until attaining the degree; the accumulated credit for the thesis must total at least 30 semester credit hours to attain the degree. A student must prepare a written dissertation and successfully pass an oral examination before a dissertation committee and other interested persons on its content before receiving the degree. The minimum residence requirement for the PhD degree is six semesters of scholarly work beyond the bachelor's degree.

**Administration: Examining Committees for Examinations.** Examining committees for preliminary examinations consist of three members of the economics department who teach in the relevant area. Examining committees for comprehensive examinations consist of at least two members of the economics department who teach in the relevant area, with a third member appointed from another department in cases where the student has structured a field including a course from that department.

#### **Preliminary Examinations.**

1. Written examinations are numbered so that insofar as possible the identity of the student is unknown. Each faculty member grades independently and writes no comments in the examination booklet. A meeting of the graders is called by the chair of the examination committee and the committee grade is submitted to the graduate program coordinator. The possible grades include *High Pass* or *Distinction* (used sparingly), *Pass*, and *Fail*.
2. Shortly after submission of grades a general faculty meeting is held to discuss and report examination results. In cases where the committee's initial grade was *marginal fail*, if two of the members of the committee then vote affirmatively,

a grade of *pass* will be recorded; if two of the members of the grading committee then vote negatively, a grade of *fail* will be recorded. If the vote of the grading committee is tied and the third member is absent (but will be available within seven days), the decision to pass or to fail is to be made by the reconvened grading committee. If fewer than two members of the grading committee are present and voting, or if the vote of the grading committee is tied and the third member is not available within seven days, the decision to pass or fail will be made by the assembled faculty; in such circumstances the grade is reported as *pass* if a majority votes affirmatively.

3. When examination results are reported, a student who failed should have an opportunity to discuss his performance with a member of the examining committee.

#### **Dissertation Guidelines.**

1. To facilitate progress on the dissertation, a "basic committee" consisting of a supervisor and two other members who are most interested in the proposed research is organized by the student, in conjunction with the DGS, during the third year. Any subsequent changes in this committee (or of the full committee later) must be approved by the supervisor and recorded with the graduate program coordinator after all basic committee members have been consulted.
  2. By January 1 of the academic year following the research colloquium, each student must submit a written dissertation proposal and conduct an oral defense of that proposal before his or her basic committee. A dissertation proposal form must be signed by each member of the basic committee and submitted to the graduate program coordinator as well by this date. An acceptable proposal must include a statement of purpose and a justification for the importance of the work; a full literature review and a statement of how this research will contribute to the literature; and a detailed description of the methodologies to be used and of the data bases, if appropriate.
  3. A successful proposal defense will result in a letter from the basic committee to the candidate indicating that successful completion of the planned research will constitute an acceptable dissertation. Students who fail to present a proposal in a timely fashion will be denied a passing grade on dissertation credit for which they are registered.
  4. Ordinarily, within three months of the dissertation proposal presentation, the DGS, in consultation with the dissertation supervisor, appoints remaining members of the full dissertation committee. A full dissertation committee consists of at least four faculty members from the economics department and one member from outside the department.
  5. Normally students are expected to complete their dissertations by the end of their fifth academic year. The graduate program coordinator provides details on submission of the dissertation and arrangements for the oral defense. After the defense, minor changes are agreed upon between candidate and supervisor. If major changes arise, the candidate and supervisor will consult with the DGS on a future course of action.
- Yearly Review.** Each spring the DGS and the department's Graduate Curriculum Committee meet to review the progress of each student in the PhD program. The regulations herein serve as a standard of minimal acceptable progress.

## English

*Degrees*..... BA, MA, MFA, PhD

The undergraduate degree in English emphasizes knowledge and awareness of:

- canonical and non-canonical works of English and American literature;
- the general outlines of the history of British and American literature;
- literary theories, including recent theoretical developments; and
- the social and historical contexts in which the traditions developed.

In addition, students completing the degree in English are expected to acquire the ability and skills to:

- analyze literary texts;
- interpret texts on the basis of such analysis;
- relate analyses and interpretations of different texts to one another; and
- communicate such interpretations competently in written form.

The undergraduate degree in creative writing emphasizes knowledge and awareness of:

- literary works, including the genres of fiction, poetry, playwriting, and screenwriting, and the major texts of contemporary writers;
- literary history, including the origins and development of genres, major writers of the past, and the role of the writer in society; and
- literary analysis, including theories of literary composition and critical theory.

In addition, students completing the degree in creative writing are expected to acquire the ability and skills to:

- write in various poetic modes and styles;
- write in various fictive styles;
- write in various nonfiction styles; and
- evaluate other students' written work.

### Bachelor's Degree Programs

Expository writing courses (except ENGL 1001 and 3151) do not apply toward the major. English courses taken on a pass/fail basis do not fulfill major requirements. Independent study credit hours cannot fulfill a major requirement unless that requirement is not being offered or available within the year that the student graduates. A minimum of 12 hours of upper-division course work for the English major must be completed on the Boulder campus. English courses taken at other colleges must be evaluated by the Department of English. Courses taken in other departments (except approved cross-listed courses) normally do not count toward the English major.

NOTE: For the Advanced Placement examination in English literature and composition, students will receive credit for ENGL 1500 for an exam score of 4 or 5.

Students must complete the general requirements of the College of Arts and Sciences and one of the two programs listed below.

### Literature

Students are subject to the major requirements in effect at the time they formally declare the major. A minimum of 36 credit hours must be earned in the Department of English, 18 of which must be upper division. Requirements may be fulfilled by taking specific courses designated by the Department of English.

<i>Required Courses</i>	<i>Semester Hours</i>
ENGL 2000 Literary Analysis . . . . .	3
ENGL 2010 Introduction to Literary Theory . . . . .	3
One course from each: backgrounds to literature in English, British literature to 1660, British literature after 1660, and American literature . . . . .	12
One course from both categories: advanced theory/genre studies/popular culture and multicultural/gender studies . . . . .	6
ENGL 4038 Critical Thinking in English Studies . . . . .	3
Three elective courses in English . . . . .	9

In addition to the 36 hours required for the major, another 9 hours may be taken, for a maximum of 45 hours in English.

The recommended sequence of courses to be taken during the initial year of the literature program is ENGL 2000 and an English elective for the first semester, and ENGL 2010 and a 2000-level ENGL course for the second semester.

### Creative Writing

Students are subject to those major requirements in effect at the time they formally declare the major.

A minimum of 36 credit hours must be earned in the Department of English, 18 of which must be upper division.

<i>Required Courses</i>	<i>Semester Hours</i>
ENGL 2000 Literary Analysis . . . . .	3
ENGL 2010 Introduction to Literary Theory . . . . .	3
One course from any two of the following: backgrounds to literature in English, British literature to 1660, British literature after 1660, and American literature . . . . .	6
One course from advanced theory/genre studies/popular culture or multicultural/gender studies . . . . .	3
ENGL 4038 Critical Thinking in English Studies . . . . .	3
Six creative writing workshops, three of which must be upper division . . . . .	18

In addition to the 36 hours required for the major, another 9 hours may be taken, for a maximum of 45 hours in English.

The recommended sequence of courses to be taken during the initial year of the creative writing program is ENGL 2000 and ENGL 1191 for the first semester, and ENGL 2010 and a 2000-level workshop for the second semester.

Admission to the creative writing program is not automatic. Students must have completed at least 6 hours of writing within the program before being considered; for transfer students, 3 hours of creative writing can be transferred in. In addition, they must submit two copies of a manuscript (at least 7 poems, 20 pages of fiction, or a short stage or screen play) to the admissions committee for approval. Students should apply no later than the second semester of their junior year.

In order to take a workshop beyond the 2000-level, students who have not been formally admitted to the creative writing program must submit a manuscript to the Department of English prior to registration. Each workshop may be taken three times for credit. Students may not take two poetry or two fiction workshops in the department in the same semester.

### Advising

The associate chair for undergraduate studies oversees the department advising program, working in conjunction with the College of Arts and Sciences Academic Advising Center. Upon declaring an English major, students are assigned to one of three primary English advisors. The primary advisors are available

to meet with students by appointment or on a drop-in basis. The primary advisors monitor and evaluate student progress in completing the arts and sciences core curriculum and major requirements, evaluate transfer credit, preapprove study abroad course work, and certify students for graduation. The department encourages students to meet with their primary advisor at least once each semester to update their student file and ensure that they are making satisfactory progress in meeting the core and major requirements.

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for information. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in English, students should meet the following requirements:

Declare the English major and begin course work in the major no later than the beginning of the second semester.

Successfully complete one-third of the hour requirements for the major by the end of the fourth semester. For literature track majors, this includes ENGL 2000, 2010, an English elective, and any 2000-level course for the major. For creative writing track majors, this includes ENGL 2000, 1191, 2010, and 2021 or 2051, as well as formal admission to the program.

Successfully complete two-thirds of the hour requirements for the major by the end of the sixth semester.

Successfully complete the remaining major requirements by the end of the eighth semester.

### *Departmental Honors*

Students interested in pursuing a special program leading to graduation with departmental honors should confer with the associate chair for undergraduate studies as soon as possible, but definitely no later than the beginning of spring term in their junior year.

### *Students Who Contemplate Teaching*

Sheets listing the curriculum required for a teaching license for secondary schools may be obtained in Education 151. Since fulfilling requirements for both education and English makes a very tight schedule, students should seek early advising to complete their college requirements.

### *Undergraduate English Awards and Prizes*

**The Katherine Lamont Scholarship.** The Lamont scholarship is a variable annual award to a continuing English major in recognition of sustained excellence and exceptional scholarly performance in the major.

**The Harold D. Kelling Essay Prize.** The Kelling prize is a variable cash award for the best essay on literature submitted by an undergraduate currently enrolled in the university. The essay must have been written for an English class at CU-Boulder and should be submitted to the English department before March 15.

**The Jovanovich Imaginative Writing Prize.** The Jovanovich prize is an annual award for excellence in poetry, fiction, playwriting, or nonfiction prose. Information is available in Hellems 111.

## Graduate Degree Programs

### *Admission Requirements*

**Master's Degree in English.** The MA program offers theory and literary history combined with a rigorous training in critical analysis. Applicants interested in *English literature* should have satisfactory scores on the verbal and analytical writing sections of the GRE General Test. In addition, at least 24 credit hours in English (exclusive of composition, creative writing, and speech)

are normally required for admission. Fifteen of the 24 hours must be in upper-division courses.

**Master of Fine Arts Degree in Creative Writing.** Applicants interested in creative writing must submit satisfactory scores on the verbal and analytical writing sections of the GRE. In addition, a BA degree, with an English major or at least 18 credit hours in English, is normally required. Each student must submit a manuscript of at least 10 pages of poetry or a minimum of 25 pages of fiction, nonfiction prose (other than literary criticism), or a screen or stage play for evaluation.

**Doctoral Degree in English.** Students must present satisfactory scores on the verbal and analytical writing sections of the GRE General Test and on the Advanced Literature Test, and must have either an MA degree in English or at least 30 hours of post-graduate English course work beyond the BA degree. Entering graduate students with no degree beyond the BA are normally admitted to the MA program. They may later apply for admission to the PhD program.

### *Degree Requirements*

Students wishing to pursue graduate work in English should note requirements for advanced degrees in the Graduate School section and write the department for a more complete description of graduate programs in English, or visit [www.colorado.edu/English](http://www.colorado.edu/English).

## Environmental Studies

*Degrees*..... BA, MS, PhD

The environmental studies major is administered through the Office of Environmental Studies and draws from curricula in the earth and natural sciences as well as the social sciences. See the program office (Benson Earth Sciences 246A) for details of the program requirements.

The bachelor's degree program is composed of a required common curriculum that exposes all students to the basics of physical and social environmental sciences, as well as to a choice between two tracks. The environmental science track has specializations in water, biogeochemistry, and climate, and the society and policy track has specializations in environment and natural resources, environmental analysis, international environment and development, and decision-making, planning, and policy.

The undergraduate degree in environmental studies emphasizes knowledge and awareness of:

- the causes, scale, and relative importance of the major environmental problems in the United States and the world;
- the complexity of factors relating to human interaction with the environment, especially the fact that environmental problems have both human and biophysical components; and
- the general principles of human-environmental interaction, global habitability and environmental change, and sustainable human societies.

Environmental studies is an interdisciplinary program, drawing on courses and expertise from over a dozen departments. Students who also wish to pursue a traditional, discipline-based education are encouraged to double major or complete a minor in one of the participating departments. An internship program is offered to provide the upper-level student with practical experience working in the field.

Students interested in environmental studies may want to consider the Baker Residential Academic Program. See Residential Academic Programs for more information.

## Bachelor's Degree Programs

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

The degree program in environmental studies is undergoing revision. Students should consult the website [envs.colorado.edu](http://envs.colorado.edu) or the academic advisor in Benson 246.

### Common Curriculum

Students are expected to complete the following common curriculum:

<i>Required Courses</i>	<i>Semester Hours</i>
ENVS 1000 Introduction to Environmental Studies . . . . .	4
Biology sequence (EBIO 1030 and 1040 Biology: A Human Approach 1 and 2, and EBIO 1050 Biology: A Human Approach Laboratory; or EBIO 1210 and 1220 General Biology 1 and 2, and EBIO 1230 and 1240 General Biology Lab 1 and 2) . . . . .	7-8
Chemistry sequence (CHEM 1011 and 1031 Environmental Chemistry 1 and 2; or CHEM 1021 Introduction to Chemistry and 1113 General Chemistry; or CHEM 1113 and 1133 General Chemistry 1 and 2; or CHEM 1351 and 1371 Honors General Chemistry 1 and 2) . . . . .	7-10
Economics sequence (ECON 1000 Introduction to Economics or ECON 2010 Principles of Microeconomics and ECON 3535 Natural Resource Economics and ECON 3545 Environmental Economics). Note: Students doing track A must complete both ECON 3535 and 3545; students doing track B must complete either ECON 3535 or 3545. . . . .	7-10
Geography, geology, or atmospheric science sequence (GEOG 1001 Environmental Systems 1: Climate and Vegetation and 1011 Environmental Systems 2: Landscapes and Water; or GEOL 1010 and 1020 Introduction to Geology 1 and 2 and 1030 Introductory to Geology Lab 1 and 2; or GEOL 1010 Introduction to Geology 1 and GEOL 1060 Global Change); or ATOC 1050 Weather and Atmosphere 1 and ATOC 1060 Our Changing Environment . . . . .	8
Lab requirement (a total of three 1000-level labs from any of the following: CHEM, EBIO, GEOL, or GEOG). Track B students are encouraged to take all labs	
PHIL 3140 Environmental Ethics or GEOG 3422 Conservation Thought or PSCI 3064 Environmental Political Theory . . . . .	3
PSCI 3206 The Environment and Public Policy or PSCI 2101 Introduction to Public Policy Analysis . . . . .	3
One calculus or statistics course . . . . .	3-5
In addition, students are required to complete either Track A (Society and Policy), or Track B (Environmental Sciences). Each track has several choices of specializations. An internship may be used as one course in a specialized area. Courses used to satisfy a common curriculum requirement cannot be used to satisfy a specialization requirement.	

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Track A: Society and Policy

Students must complete the three required courses and one of the four areas of specialization.

ANTH 4150 Human Ecology or EBIO 2040 Principles of Ecology or ENVS/CVEN 3434 Introduction to Applied Ecology . . . . .	3-4
ECON 3545 Environmental Economics. . . . .	3
GEOG 3412 Conservation Practice. . . . .	3

#### Environment and Natural Resources

Complete a minimum of 15 credit hours from the following courses:

EBIO 4060 Landscape Ecology . . . . .	3
ENVD 4023 Environmental Impact Assessment . . . . .	3
ENVS 3001 Sustainable Solutions Consulting . . . . .	3
ENVS 3621 Energy Policy and Society. . . . .	3
ENVS/EBIO 3040 Conservation Biology . . . . .	3
GEOG 3251 Mountain Geography . . . . .	3
GEOG 3351 Biogeography. . . . .	3
GEOG 3662 Economic Geography . . . . .	3
GEOG 4371 Forest Geography . . . . .	3

GEOG 4430 Seminar: Conservation Trends . . . . .	3
GEOG 4501 Water Resources and Water Management of the Western U.S. . . . .	3
GEOG 4732 Population Geography . . . . .	3
GEOG 4742 Environment and Peoples . . . . .	3
GEOL 3500 Earth Resources and the Environment. . . . .	3
GEOL 3070 Introduction to Oceanography . . . . .	3
HIST 4417 Environmental History of North America . . . . .	3
PHYS/ENVS 3070 Energy and the Environment. . . . .	3
SOCY/ENVS 4027 Inequality, Democracy, and the Environment . . . . .	3

#### International Environment and Development

Complete a minimum of 15 credit hours from the following courses:

ECON 3403 International Economics and Policy . . . . .	3
GEOG 3672 Gender and Global Economy . . . . .	3
GEOG 3682 Geography of International Development . . . . .	3
ECON 3784 Economic Development and Policy . . . . .	3
GEOG 3812 Mexico, Central America, and the Caribbean. . . . .	3
GEOG 3822 Geography of China . . . . .	3
GEOG 3862 Geography of Africa . . . . .	3
GEOG 4712 Political Geography . . . . .	3
PHIL 2140 Environmental Justice . . . . .	3
PSCI 2223 Introduction to International Relations . . . . .	3
PSCI 3143 Problems in International Relations. . . . .	3
PSCI 3193 International Behavior . . . . .	3
PSCI 4012 Global Development. . . . .	3
PSCI 4173 International Organization . . . . .	3
PSCI 4183 International Law . . . . .	3
PSCI 4783 Global Issues. . . . .	3
SOCY 3002 Population and Society . . . . .	3
SOCY/WMST 3012 Women, Development, and Fertility. . . . .	3
SOCY 4007 Global Human Ecology. . . . .	3

#### Decision Making, Planning, and Public Policy

Complete a minimum of 15 credit hours from the following courses:

ATOC 4800 Policy and Climate . . . . .	3
ENVS 3001 Sustainable Solutions Consulting . . . . .	3
ENVS 3621 Energy Policy and Society. . . . .	3
ENVD 4023 Environmental Impact Assessment . . . . .	3
ENVS/PHYS 3070 Energy and the Environment. . . . .	3
GEOG 3402 Natural Hazards . . . . .	3
GEOL 3950 Natural Catastrophes . . . . .	3
PHIL 2140 Environmental Justice . . . . .	3
PSCI 2101 Introduction to Public Policy Analysis . . . . .	3
PSCI 3206 Environment and Public Policy . . . . .	3
SOCY 2077 Environment and Society . . . . .	3

#### Environmental Analysis

Complete a minimum of 15 credit hours from the following courses:

ATOC 3300 Analysis of Climate and Weather Observations . . . . .	3
ECON 4808 Introduction to Mathematical Economics. . . . .	3
ENVS 3001 Sustainable Solutions Consulting . . . . .	3
ENVS 3621 Energy Policy and Society. . . . .	3
ENVD 4023 Environmental Impact Assessment . . . . .	3
GEOG 2053 Mapping a Changing World. . . . .	4
GEOG 3053 Cartography 1: Visual/Information Design . . . . .	4
GEOG 4043 Cartography 2: Multimedia . . . . .	4
GEOG 4093 Remote Sensing of the Environment. . . . .	4
GEOG 4103 Introduction to Geographic Information Science . . . . .	4

#### Track B: Environmental Sciences

Students must complete the required courses and one of three areas of specialization.

Calculus. . . . .	4-5
EBIO 2040 Principles of Ecology or GEOG 3601/ATOC 3600/ENVS 3600 Principles of Climate or CVEN/ENVS 3434 Introduction to Applied Ecology . . . . .	3
GEOG 3511 Introduction to Hydrology . . . . .	4
Field course: EBIO 4350 Biological Field Studies or Mountain Research Station field course or GEOL 2700 Introduction to Field Geology and one other 2-credit geology field course or CVEN/ENVS 3434 Introduction to Applied Ecology . . . . .	3-4



**Water**

Complete a minimum of 12 credit hours from the following courses:

CVEN 4404 Water Quality . . . . .	4
EBIO 3190 Tropical Marine Ecology . . . . .	3
EBIO 4020 Stream Biology . . . . .	3
EBIO 4030 Limnology . . . . .	3
EBIO 4110 Freshwater Marine Ecology . . . . .	2-4
EBIO 4460 Fish Ecology . . . . .	4
GEOG/GEOL 4241 Principles of Geomorphology . . . . .	4
GEOG 4251 Fluvial Geomorphology . . . . .	4
GEOG 4321 Snow Hydrology . . . . .	4
GEOG 4430 Seminar: Conservation Trends (water topic) . . . . .	3
GEOG 4501 Water Resources and Water Management of Western United States . . . . .	3
GEOL 3030 Introduction to Hydrogeology . . . . .	3
GEOL 4060 Oceanography . . . . .	4

**Biogeochemistry**

Complete a minimum of 12 credit hours from the following courses:

CHEM 4191 Environmental Chemistry of the Biosphere . . . . .	3
ENVS/GEOL 3520 Environmental Issues in Geosciences . . . . .	3
ENVS/EBIO/GEOL 4160 Introduction to Biogeochemistry . . . . .	3
EBIO 3270 Ecosystem Ecology . . . . .	3
GEOG/GEOL 4241 Principles of Geomorphology . . . . .	4
GEOG 4251 Fluvial Geomorphology . . . . .	4
GEOG 4401 Soils Geography . . . . .	3
GEOL 3040 Global Change: Recent Geological Record . . . . .	3
GEOL 3320 Geochemistry . . . . .	3
GEOL 4060 Oceanography . . . . .	4

**Climate**

Complete one physics sequence and a minimum of 12 credit hours from the following courses:

ATOC 3300/GEOG 3301 Analysis of Climate and Weather Observations . . . . .	3
ATOC 3500 Air Chemistry and Pollution . . . . .	3
ATOC 4710 Atmospheric Physics . . . . .	3
ATOC 4720 Atmospheric Dynamics . . . . .	3
ATOC 4750 Desert Meteorology . . . . .	3
ATOC 4800 Policy and Climate . . . . .	3
ENVS/GEOG 4201 Biometeorology . . . . .	3
GEOG 4211 Physical Climatology: Principles . . . . .	3
GEOL 3040 Global Change: Recent Geological Record . . . . .	3
GEOL 4060 Oceanography . . . . .	4

Choose one sequence from the following:

PHYS 1110 and 1120 General Physics 1 and 2; or PHYS 2010 and 2020 General Physics 1 and 2 . . . . .	8-10
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**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in environmental studies, students should meet the following requirements:

Begin the common curriculum in the freshman year.

Declare environmental studies as the major by the beginning of the second semester.

Students must consult with a major advisor to determine adequate progress toward completion of major requirements.

**Graduate Studies**

Opportunities for interdisciplinary graduate studies and original research, leading to the MS and PhD degrees, are available with a variety of emphases, including water sciences, environmental policy and sustainability, energy, environmental social sciences, and biogeosciences. Particular programs of study are limited only by course offerings and faculty expertise.

**Master's Degree**

Candidates for the master's degree in environmental studies must complete at least 36 credit hours of graduate course work. Both thesis (Plan I) and non-thesis (Plan II) options are available. Plan I requires that the student write and successfully defend a thesis for 6 research credits. Students who opt for Plan II must complete a 2-credit internship as part of their program. Additional information can be found at [envs.colorado.edu](http://envs.colorado.edu).

**MS/MBA**

This is a dual degree program offered in conjunction with the Leeds School of Business. It requires 36 hours of graduate work in environmental studies and 43 hours of MBA course work (with 12 hours of environmental studies course work applying toward the required 55 credits for the MBA). The MBA program will be considered the student's primary program.

**MS/JD or PhD/JD**

This is a dual degree program offered in conjunction with the Law School. The Law School will grant credit for acceptable performance in graduate-level environmental studies courses toward the JD degree for up to 9 (for MS students) or 12 (for PhD students) credit hours of the required 89 credits for the JD degree. Environmental studies will grant up to 9 (for MS students) or 12 (for PhD students) credit hours of acceptable performance in law courses. The JD program will be considered the student's primary program.

**Doctoral Degree**

The PhD degree is a research degree, involving the production of a major piece of original research (the dissertation). Candidates for the doctoral degree must complete at least 42 degree-hours from a list of approved ENVS core and elective courses. In addition, 30 semester hours of dissertation credit must be taken. Students are expected to form an advisory committee of five faculty members (including one from outside ENVS) soon after beginning their studies. This committee helps the student in designing a research program and in making choices concerning course work. The PhD comprehensive exam is administered by the student dissertation committee and must be taken within the first five semesters of degree work. It consists of a written research proposal on the dissertation topic, a formal presentation summarizing the student research progress, and an oral examination centered on the student research. Upon the student completion of the dissertation, a final examination is administered by the dissertation committee.

Additional information may be found at [envs.colorado.edu](http://envs.colorado.edu).

**Ethnic Studies**

*Degree* ..... BA

The ethnic studies major was created to initiate and promote interdisciplinary research and teaching in Africana studies, American Indian Studies, Asian American studies, Chicana and Chicano studies, American studies, and cross cultural/comparative studies.

The discipline of ethnic studies comprises a series of distinct approaches and theoretical analyses of the historical, political, social, and cultural forces and phenomena that have shaped the development of America's diverse racial and ethnic peoples. This approach begins with an overview and understanding of these group experiences prior to the time of the European inva-

sion, and continues with a subsequent and primary analysis of the impact that race and ethnicity has had in America during the past 500 years.

The ethnic studies major provides a broad liberal arts education to all students. It imparts fundamental skills in critical thinking, comparative analysis, and oral and written expression. The major provides appropriate training especially for those considering admission to graduate or professional schools and careers in education, law, medicine, public health, school work, journalism, business, urban planning, politics, counseling, international relations, creative writing, as well as university teaching and research.

The Department of Ethnic Studies has a core faculty of its own, but also draws on the faculty resources of many departments in the College of Arts and Sciences, as well as the College of Architecture and Planning, the School of Education, the School of Journalism and Mass Communication, the School of Law, the College of Music, and University Libraries.

### Bachelor's Degree Program

In addition to the general requirements of the College of Arts and Sciences, students must complete 33 credit hours of ethnic studies requirements: 12 hours of required ethnic studies core classes and an additional 21 credit hours in ethnic studies, 15 hours of which must be upper division for a total of 24 upper-division credits in the major (required courses mentioned below are included). The 21 credit hours in ethnic studies can be selected from the current ethnic studies course offerings; they may include courses that are cross-listed with the Department of Ethnic Studies, as listed in this catalog.

A grade of C- or better must be received in all courses used to satisfy the major requirements, with an overall average of 2.00 in the major. No more than 6 credit hours may be taken in independent study. No *pass/fail* graded courses may satisfy the 33-semester-hour minimum requirement.

<i>Required Courses</i>	<i>Semester Hours</i>
ETHN 2001 Foundations of Ethnic Studies . . . . .	3
ETHN 3501 Research Methods in Ethnic Studies . . . . .	3
ETHN 4511 Research Practicum . . . . .	3
ETHN 4951 Senior Seminar in Ethnic Studies. . . . .	3

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in ethnic studies, students should meet the following requirements:

- Declare ethnic studies as their major no later than the beginning of the second semester of study.
- Complete at least 12 credit hours toward the ethnic studies major requirements by the fourth semester.
- Complete at least 21 credit hours toward the ethnic studies major requirements by the end of the sixth semester.
- Complete ETHN 3501 Research Methods in Ethnic Studies no later than the sixth semester.
- Complete ETHN 4511 Research Practicum in Ethnic Studies no later than the seventh semester.
- Complete ETHN 4951 Senior Seminar in Ethnic Studies no later than the eighth semester.

### Minor Program

A minor is offered in ethnic studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/arts\\_sciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/arts_sciences/students/undergraduate/academics/minors.html).

### Graduate Certificate in Comparative Ethnic Studies (GCCES)

In order to enhance the Graduate School training for enrolled graduate students at the University of Colorado at Boulder, the Department of Ethnic Studies (DES) has been approved to offer a 12-credit Graduate Certificate in Comparative Ethnic Studies (GCCES). The purpose of the certificate is to provide specialized training opportunities in race/ethnicity and gender studies, research and interdisciplinary training in Africana studies, American Indian studies, Asian American studies, Chicana/o-Latina/o studies, decolonial feminist studies, comparative ethnic studies, racial and sexuality studies, and transnational/hemispheric ethnic studies to students pursuing degrees in various disciplines on campus. The certificate is the initial phase of graduate study within the department and signals the forthcoming Department of Ethnic Studies PhD program in comparative ethnic studies. This doctoral degree has a target start date of fall 2010 pending approval from the college, provost, chancellor, and the Board of Regents.

### Ethnic Studies Faculty Involvement in Graduate Studies

Faculty actively work to recruit African American, American Indian, Asian American, and Chicana/o students for graduate studies at the CU-Boulder, with special attention given to students who are interested in carrying out theses and/or dissertations that involve substantive and theoretical work revolving around the broad topic of "ethnicity and race in America." Faculty are further committed to the intellectual mentorship of such students, which might include instruction in graduate courses, directed reading courses, service on students' MA or PhD committees, as well as helping to prepare graduate students for their qualifying examinations. An important dimension of this commitment includes attention to the step-by-step progress of these graduate students through their academic course work and research agendas.

Ethnic studies faculty will also recruit and employ whenever possible such students as graders and teaching assistants in large undergraduate courses, with the intention of providing experience in all aspects of classroom instruction, including syllabus design, design of assignments, grading, and issues of pedagogy vis-à-vis course content.

Ethnic studies faculty will mentor such graduate students in the area of writing for publication, and seek to facilitate publication opportunities in journals focusing on "ethnicity and race." After successful completion of graduate studies, faculty will assist graduates with their employment goals.

In sum, by making an active commitment in each of these areas, ethnic studies faculty assume a responsible, proactive role in ensuring a greater diversity in the graduate programs at the University of Colorado.

### Study Abroad

The Department of Ethnic Studies encourages students to participate in the study abroad programs offered through the Office of International Education. These programs give students a deeper

understanding of culture and attitudes of people of color in other parts of the world and their carryover into the United States. CU-Boulder partners with several study abroad organizations that offer summer, semester, and full year programs in many locations around the world, most notably in Africa, Asia, and Latin America. Programs of special interest include study abroad in Mexico, Dominican Republic, Peru, Bolivia, Ecuador, Ghana, Morocco, Spain, Taiwan, Japan, Australia, and South Africa.

For additional information, contact the Office of International Education. Students should always consult with their academic advisor prior to choosing their study abroad program.

**Film Studies**

*Degrees*..... BA, BFA

The Film Studies Program educates students in the history and development of film as an art form and contemporary medium. The curriculum instills an informed analytic awareness of the ways in which film has been used and provides the resources for significant creative exploration of the medium.

The undergraduate degrees in film studies emphasize knowledge and awareness of:

- the major artistic contributions to the evolution of film, from the advent of the moving image to the present;
- the general outlines of world film from the silent period to the present, with emphasis on the historical contributions of major national cinemas; and
- film criticism and film theory.

Students completing either the BA or the BFA degree in film studies are expected to acquire the ability and skills to:

- analyze and interpret films critically;
- communicate such interpretations competently in essay form; and
- make a short creative film or video work (BFA majors only).

NOTE: Admission to any class after the third meeting of the class is contingent on professor permission. The department may drop a student from a class if the student misses the first two classes of the semester.

**Admission to the BFA Program**

Students are encouraged to consult with the Film Studies advisor in order to obtain advice and current information.

The BFA degree is competitive. In order to graduate with a BFA degree, students must first satisfy a number of prerequisites and then submit a formal application to the BFA program at the prescribed time (deadline will be posted each semester on the film studies website). In particular, applicants must have a cumulative GPA at CU-Boulder of 2.50 or higher and have passed FILM 1502, 2000 (or 2300), and 2500 each with a grade of C or higher, with a mean GPA in all three courses of at least 3.30 (B+). Applicants must submit a written application, a writing sample, and the FILM 2500 assignment (see FILM 2500 instructions for details). Applicants may also submit one additional “best” example of creative work (see specific admission guidelines for details). Admission into the BFA program and registration for FILM 3400, 4500, and other upper-division production courses are contingent upon approval of the application materials by the BFA committee. Students may only apply twice to the BFA program; complete details on the BFA application procedure are available on the film studies website. Students are required to attend a BFA orientation

meeting prior to the semester in which they enroll in FILM 3400. BFA students are required to purchase film and sound media-capable Apple computing systems (see [www.colorado.edu/FilmStudies](http://www.colorado.edu/FilmStudies)). BFA students are required to pass FILM 3400, 3515, and 3525 before they will be allowed to continue in the major.

**Bachelor of Arts**

No more than 6 hours of independent study may be credited toward the major. Students must complete the required film courses with a grade of C or better. The arts and sciences 18-hour minimum of upper-division hours must be met with CU film studies courses.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. The Film Studies Program requires a minimum of 38 hours in support of the BA requirements, including film courses and courses taken in other departments.

The Film Studies Program strongly urges the purchase of film and sound media-capable Apple computing systems for those pursuing production classes in the BA degree program (see [www.colorado.edu/FilmStudies](http://www.colorado.edu/FilmStudies)).

*Required Courses* *Semester Hours*

**Literature and the Arts Requirement**

In addition to the 6-hour literature and the arts core requirement, Film Studies majors must take an additional 6 hours (3 of them upper-division) of literature and the arts core courses to satisfy the degree requirements. Students taking the HUMN 1010/1020 sequence are exempted from the 3-hour upper-division requirement.

**Required Critical Studies Courses**

FILM 1502 Introduction to Film Studies (Note 1) . . . . .	3
FILM 3051 and 3061 Film History 1 and 2 (Note 2) . . . . .	8
FILM 3104 Film Theory and Criticism. . . . .	3

**Critical Studies Elective Requirements**

BA students must complete 18 hours from the following courses. At least 12 must be upper division.

FILM 2002 Recent International Cinema . . . . .	3
FILM 2003 Film Topics (Note 3) . . . . .	3
FILM 2005 Movies and Screenplays . . . . .	3
FILM 2013 Film and the Quest for Truth . . . . .	3
FILM 2312 Film Trilogies . . . . .	3
FILM 2412 Melodrama and Culture . . . . .	3
FILM 2513 Major Asian Filmmakers . . . . .	3
FILM 2521 Classics of the Foreign Film: 1960s to the present. . . . .	3
FILM 2613 Good/Evil through Film . . . . .	3
FILM 3002 Major Film Movements (Note 3). . . . .	3
FILM 3003 Major Film Directors (Note 3) . . . . .	3
FILM 3004 Films of Alfred Hitchcock. . . . .	3
FILM 3005 Issues in Film Comedy . . . . .	3
FILM 3012 Documentary Film. . . . .	3
FILM 3013 Women and Film. . . . .	3
FILM 3022 Jung, Film, and Literature . . . . .	3
FILM 3023 Stage Drama into Film: O’Neill and Williams. . . . .	3
FILM 3032 Stage Tragedy and Film. . . . .	3
FILM 3033 Color and Cinema . . . . .	3
FILM 3042 Horror Film . . . . .	3
FILM 3043 Topics in Film Critical Studies (Note 3) . . . . .	3
FILM 3081 American Film in the 1980s and 1990s . . . . .	3
FILM 3091 Post-War American Film/Culture/Politics . . . . .	3
FILM 3191 The Golden Age . . . . .	3
FILM 3211 History of Russian Cinema . . . . .	3
FILM 3301 Contemporary Issues in Russian Film. . . . .	3
FILM 3422 Genre: Hollywood Musical. . . . .	3
FILM 3503 German Film Through WWII . . . . .	3
FILM 3504 Topics in German Film . . . . .	3
FILM 3513 German Film After WWII . . . . .	3
FILM 3514 German Film and Society after 1989. . . . .	3

FILM 3603 Sound and Vision . . . . .	3
FILM 3901 Independent Study (Note 4) . . . . .	1-6
FILM 3940 Film Studies Internship . . . . .	1-6
FILM 4001 Screening Race, Class, and Gender in the U.S. and the Global Borderland . . . . .	3
FILM 4003 Film and Fiction . . . . .	3
FILM 4004 Topics in Film Theory (Note 3) . . . . .	3
FILM 4013 Film, Photography, and Modernism . . . . .	3
FILM 4023 Topics in International Cinema (Note 3) . . . . .	3
FILM 4024 Advanced Research Seminar (Note 3) . . . . .	3
FILM 4043 Topics in Film Studies: Critical Studies (Note 3) . . . . .	1-3
FILM 4105 Advanced Screenwriting . . . . .	3
FILM 4453 Elective Affinities: Avant-garde Film and the Arts . . . . .	3
FILM 4604 Colloquium in Film Aesthetics . . . . .	3
Any FILM class crosslisted with another department (i.e., foreign language) that has been approved by the film studies chair . . . . .	3

### Production Electives (not required)

Some production electives may be taken for BA credit; please see advisor for specific courses.

#### Curriculum Notes

1. This course is a prerequisite for FILM 2000 and 3051.
2. Must be taken in chronological order. FILM 1502 is a prerequisite.
3. Course may be taken for credit more than once, provided that the topics vary.
4. Total number of independent study credit hours cannot exceed 6.

### Graduating in Four Years with a BA

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in film studies, students should meet the following requirements:

Declare a film studies major by the beginning of the second semester

Complete the lower- or upper-division literature and the arts requirement (3 credit hours) and FILM 1502 (3 credit hours) by the end of the fourth semester.

Complete the upper-division literature and the arts requirement (3 credit hours) and FILM 3051 and 3061 by the end of the sixth semester.

Complete 6 critical studies elective credit hours by the end of the seventh semester (at least 3 of these credits must be upper-division credits).

Complete an additional 12 credit hours of critical studies elective courses, including at least three upper-division courses (9 credit hours), and FILM 3104 (3 credits) by the eighth semester.

### Bachelor of Fine Arts

No more than 6 hours of independent study may be credited toward the major. Students must complete the required film courses with a grade of C or better.

Students must complete the general requirements of the College of Arts and Sciences as well as the required courses listed below. The Film Studies Program requires a minimum of 46 hours in support of the BFA degree requirements.

#### Required Courses

#### Semester Hours

#### Literature and the Arts Requirement

In addition to the 6-hour literature and the arts core requirement, Film Studies majors must take an additional 6 hours (3 of them upper division) of literature and the arts core courses to satisfy the degree requirements. Students taking the HUMN 1010/1020 sequence are exempted from the 3-hour upper-division requirement.

#### Required Critical Studies Courses

FILM 1502 Introduction to Film Studies (Note 1) . . . . .	3
FILM 3051 and 3061: Film History 1 and 2 (Note 2) . . . . .	8

#### Required Production Courses

FILM 2000 or 2300 Beginning/Intermediate Filmmaking (Note 3) . . . . .	3
FILM 2500 Introduction to Cinematography . . . . .	3

FILM 3400 Cinema Production 1 . . . . .	3
FILM 3515 Camera Workshop . . . . .	1
FILM 3525 Editing Workshop . . . . .	1
FILM 4500 Cinema Production 2 (Note 4) . . . . .	3

### Production Course Electives

BFA students must take 9 hours of any combination of the following courses:

FILM 2010 Moving Image Computer Foundations . . . . .	3
FILM 2105 Intro to the Screenplay . . . . .	3
FILM 2610 Animation Production . . . . .	3
FILM 2900 Lighting Workshop . . . . .	3
FILM 3010 Film Production Topics . . . . .	3
FILM 3030 Cinema Alternative Process . . . . .	3
FILM 3501 Film Production Management or FILM 3563 Producing the Feature Film (Both are usually offered through Continuing Education; only one may count toward the film studies degree.) . . . . .	3
FILM 3563 Producing the Film . . . . .	3
FILM 3600 Digital Post-production Process . . . . .	3
FILM 3620 Experimental Digital Animation . . . . .	3
FILM 3700 Digital Audio Design . . . . .	3
FILM 3900 Production Independent Study (Note 5) . . . . .	1-6
FILM 3920 Professional Seminar . . . . .	3
FILM 3940 Internship . . . . .	1-2
FILM 4000 Advanced Digital Post-production . . . . .	3
FILM 4005 Screenwriting: Short Form . . . . .	3
FILM 4010 Topics in Film Studies: Production (Note 4) . . . . .	1-3
FILM 4021 Directing/Acting for the Camera . . . . .	3
FILM 4030 Visiting Filmmakers Seminar (Note 3) . . . . .	3
FILM 4075 Scriptwriting Workshop . . . . .	3
FILM 4105 Advanced Screenwriting . . . . .	3
FILM 4240 Beginning Video Production . . . . .	3
FILM 4340 Intermediate Video Production . . . . .	3
FILM 4440 Advanced Video Production . . . . .	3
FILM 4500 Cinema Production 2 (taken a second time) . . . . .	3
FILM 4505 Screenwriting: Long Form . . . . .	3
FILM 4600 Creative Digital Cinematography (Note 4) . . . . .	3

#### Curriculum Notes

1. This course is a prerequisite for FILM 2000 and 3051
2. Must be taken in chronological order.
3. Either FILM 2000 or 2300 may be taken for degree credit. Only one of the two courses may be counted toward the BFA degree. FILM 2300 is offered summer session only.
4. Course may be taken for credit more than once.
5. Total number of independent study credit hours cannot exceed 6, and they cannot be used to duplicate regular course offerings.
6. Course may be taken for credit more than once, provided the topics vary.

### Critical Studies Elective Requirements

BFA students must complete 6 hours.

FILM 2002 Recent International Cinema . . . . .	3
FILM 2003 Film Topics (Note 3) . . . . .	3
FILM 2005 Movies and Screenplays . . . . .	3
FILM 2013 Film and the Quest for Truth . . . . .	3
FILM 2312 Film Trilogies . . . . .	3
FILM 2412 Melodrama and Culture . . . . .	3
FILM 2513 Major Asian Filmmakers . . . . .	3
FILM 2521 Classics of the Foreign Film: 1960s to the present. . . . .	3
FILM 2613 Good/Evil through Film . . . . .	3
FILM 3002 Major Film Movements (Note 3) . . . . .	3
FILM 3003 Major Film Directors (Note 3) . . . . .	3
FILM 3004 Films of Alfred Hitchcock . . . . .	3
FILM 3005 Issues in Film Comedy . . . . .	3
FILM 3012 Documentary Film . . . . .	3
FILM 3013 Women and Film . . . . .	3
FILM 3022 Jung, Film, and Literature . . . . .	3
FILM 3023 Stage Drama into Film: O’Neill and Williams . . . . .	3
FILM 3032 Stage Tragedy and Film . . . . .	3
FILM 3033 Color and Cinema . . . . .	3
FILM 3042 Horror Film . . . . .	3

FILM 3043 Topics in Film Critical Studies (Note 3) . . . . .	3
FILM 3081 American Film in the 1980s and 1990s . . . . .	3
FILM 3091 Post-War American Film/Culture/Politics . . . . .	3
FILM 3104 Film Theory and Criticism. . . . .	3
FILM 3191 The Golden Age . . . . .	3
FILM 3211 History of Russian Cinema . . . . .	3
FILM 3301 Contemporary Issues in Russian Film. . . . .	3
FILM 3422 Genre: Hollywood Musical. . . . .	3
FILM 3503 German Film Through WWII . . . . .	3
FILM 3504 Topics in German Film . . . . .	3
FILM 3513 German Film After WWII . . . . .	3
FILM 3514 German Film and Society after 1989. . . . .	3
FILM 3603 Sound and Vision . . . . .	3
FILM 3901 Independent Study (Note 4) . . . . .	1-6
FILM 3940 Film Studies Internship . . . . .	1-6
FILM 4001 Screening Race, Class, and Gender in the U.S. and the Global Borderland . . . . .	3
FILM 4003 Film and Fiction . . . . .	3
FILM 4004 Topics in Film Theory (Notes 3 and 5). . . . .	3
FILM 4013 Film, Photography, and Modernism. . . . .	3
FILM 4023 Topics in International Cinema 3 (Note 3) . . . . .	3
FILM 4024 Advanced Research Seminar (Note 3) . . . . .	3
FILM 4043 Topics in Film Studies: Critical Studies (Note 3). . . . .	3
FILM 4105 Advanced Screenwriting. . . . .	1-3
FILM 4453 Elective Affinities: Avant-garde Film and the Arts. . . . .	3
FILM 4604 Colloquium in Film Aesthetics . . . . .	3

Any FILM class crosslisted with another department (i.e., foreign language) that has been approved by the film studies chair . . . . . 3

#### Curriculum Notes

1. This course is a prerequisite for FILM 2000 and 3051.
2. Must be taken in chronological order. FILM 1502 is a prerequisite.
3. Course may be taken for credit more than once, provided that the topics vary.
4. Total number of independent study credit hours cannot exceed 6.
5. FILM 4004, Topics in Film Theory, satisfies college requirement for critical thinking CORE.

### Graduating in Four Years with a BFA

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in film studies, students should meet the following requirements:

- Declare and start the film studies major the first semester freshman year.
- Complete FILM 1502 (3 credit hours), FILM 2000 (3 credit hours), and one lower- or upper-division critical studies course for 3 credits by the end of the third semester.
- Complete the Literature and the Arts lower- or upper-division requirement (3 credit hours), and FILM 2500 (3 credit hours) by the end of the fourth semester.
- NOTE: In order to graduate in four years, a student must be accepted into the BFA program on the first application. See “Admission to the BFA Program” for details of the application process.
- Complete 3 credit hours of upper-division Literature and the Arts requirement (3 credit hours) and FILM 3051 and FILM 3061 (8 credit hours) by the end of the fifth semester.
- Complete FILM 3400 (3 credit hours), 3515 (1 credit hour), 3525 (1 credit hour), and an additional 3 credit hours of upper-division critical studies elective requirements by the end of the sixth semester.
- Complete two courses (6 credit hours) of production electives by the end of the seventh semester.
- Complete 3 credit hours of FILM 4500 and 3 more credit hours of production electives by the end of the eighth semester.

### Master of Fine Arts Degree in Film

The Graduate MFA degree in film studies is a filmmaking track integrated into the Art and Art History MFA program in much

the same way as the tracks in painting and drawing, ceramics, sculpture, media arts, the IAP, and printmaking. The filmmaking track prepares students for professional artistic careers in filmmaking from the perspective of innovative image making. The aim of the MFA film program is to aid in the advancement of the practice and understanding of art, with emphasis on the moving image and its role in this advancement. The MFA will, therefore, prepare graduates to assume creative leadership roles in filmmaking.

The interdisciplinary nature of the MFA program allows graduate students to work in various areas, in addition to their area of specialization. The MFA guidelines include a second area of the student’s choice as a requirement. The thesis project is two-fold, involving 1.) the student’s creative work (e.g., a film), displayed at the MFA exhibition, and 2.) a written thesis that eventually goes to the library.

See the Art and Art History section for descriptions of the MFA ARTF courses.

**Prerequisites.** The following are required for admission to the graduate program:

Bachelor’s degree from an approved college or school of art with a minimum grade point average of 2.75.

Minimum of 34 credit hours of acceptable work in art; 12 credits in fine arts history is preferred.

Submission of films and other examples representing creative work or electronic media. Students should submit a portfolio of creative work to include video and/or audio tapes, film, etc., as appropriate (especially for documentation of performance and/or installations) for screening by the electronic media committee for presentation to the full graduate faculty.

**Degree Requirements.** Effective fall 2008, the MFA program is a two-and-a-half year program. The degree requires a minimum of 54 credit hours of course work, of which 36 must be taken in residence on the Boulder campus, with the following requirements:

Required Courses	Semester Hours
Home studio (major area). . . . .	min. 12
Electives (studio and non-studio; up to 6 credits may be taken in an allied field, at the 3000 level and above). . . . .	21
Art history and theory . . . . .	9
Visiting artist seminar . . . . .	3
Graduate art seminar . . . . .	3
Thesis . . . . .	6

For the Film Track MFA students: ARTF 5030 Visiting Filmmakers Seminar is allowed as a substitute for ARTS 5118 Visiting Artist Seminar; ARTF Critical Studies courses are allowed as alternates to fulfill 3 hours of the art history requirement.

See the art and art history department section of this catalog and [www.colorado.edu/FineArts/mfa/mfa\\_degree.html](http://www.colorado.edu/FineArts/mfa/mfa_degree.html) for more information on requirements.

### Bachelor of Arts/Master of Arts (BAMA)

**Overview.** The film studies/art and art history bachelor of arts/master of arts critical studies degree gives highly-motivated BA students the opportunity to earn an MA degree using an accelerated undergraduate program in combination with a fifth year of study.

**Program Description.** The BA/MA degree in film studies (FS) is a critical studies track under the auspices of the Art and Art History (AAH) MA program. This collaboration between AAH and FS is an extension of our common interests in visual art and grows from our current shared MFA in filmmaking. The film studies tenured and tenured track faculty also has graduate faculty standing within art and art history.

The FS/AAH BA/MA track prepares students for professional careers in teaching and criticism, from the perspective of innovative critical approaches and in preparation for a PhD track at another university. The aim of the BA/MA film program is to aid in the advancement of the scholarly understanding of film art, with emphasis on theoretical and research approaches and their role in academia. The BA/MA will, therefore, prepare its graduates to assume the responsibilities of the academic study of cinema as one of the fine arts and to pursue careers in teaching, research, curating, and the overall advancement of the study of cinema as art.

The program offers studies leading to the MA in the areas of film criticism and theory. Advanced students are encouraged to explore interdisciplinary approaches as well as to enhance their program of study with cognate courses in other departments such as history, comparative literature, anthropology, English, women's studies, ethnic studies, Spanish and Portuguese, French and Italian, Germanic and Slavic languages and literatures, and others. Film studies offers a broad selection of seminar topics on their current faculty research interests and in response to student demand. The Visiting Film Artist program brings additional distinguished, innovative film and video artists and critics to campus and students are encouraged to register for their seminars.

#### Admission to the Program

Admission to the program occurs during the second semester of the junior year. Applicants should have a cumulative GPA of 3.00 and have completed all MAPS deficiencies.

Only currently enrolled CU-Boulder students may be considered for admission to the program. Transfer students must complete at least 24 credit hours as degree-seeking students before applying to the program. The BA/MA degree is limited to film BA (critical studies) students. By definition BFA (production) students do not have the BA/MA option.

Students who are admitted to the concurrent degree program may not pursue a double degree or double major of any other kind.

Applicants to the BA/MA program must complete the application process no later than the first Friday of October during their junior year. Prior to applying, they should have completed FILM 1502, FILM 3051, and FILM 3061 (for recommended sequence, see [www.colorado.edu/FilmStudies/degrees/bama/reqs.htm](http://www.colorado.edu/FilmStudies/degrees/bama/reqs.htm)).

The application form can be downloaded from [www.colorado.edu/GraduateSchool/GSForms/ConcurrentForms/Concurrentapplication.pdf](http://www.colorado.edu/GraduateSchool/GSForms/ConcurrentForms/Concurrentapplication.pdf). NOTE: Applicants should specify on the form that they are applying for the spring term, BA/MA degree, major codes AS-FLM2 and GR-ART2.

For more information visit [www.colorado.edu/FilmStudies/degrees/bama/index.shtml](http://www.colorado.edu/FilmStudies/degrees/bama/index.shtml).

## French and Italian

*Degrees in French* ..... BA, MA, PhD

*Degree in Italian* ..... BA

### Bachelor's Degree Programs

#### French

Beyond providing mastery of the language skills (listening, speaking, reading, writing) of modern French needed for all purposes of daily life, the major introduces students to a central tradition of western and world culture. Since the Middle Ages, French literature, thought, taste, and art have helped shape the essential experience and self-understanding of humanity at large. Survey courses and upper-division seminars offer a range of exposures to the French cultural past and the far-flung ethnic and national diversity of the French-speaking present. The ma-

ior explores distinctively French contributions to world culture, such as Arthurian romance, troubadour poetry, and Gothic architecture; the love sonnets of the Pléiade, the comic novels of Rabelais, and the essays of Montaigne; the neoclassical theatre of Corneille, Molière, and Racine and the critical philosophy of Descartes and Pascal; the Enlightenment philosophies of Voltaire, Diderot, and Rousseau; the psychological refinements of French fiction from Mme de La Fayette to Proust; artistic revolutions like impressionism and surrealism; the renewal of artistic conventions in the Theatre of the Absurd, the New Novel, and the cinema of the New Wave; the French-language literature of Africa, Canada, and the Caribbean; and the vital presence of French writers in major movements of 20th century thought like existentialism, structuralism, feminism, psychoanalysis, and contemporary cultural studies and multiculturalism.

The undergraduate degree in French emphasizes knowledge and awareness of:

- the fundamental outlines of the history of French literature from the Middle Ages to the present;
- significant works of French literature and the literary culture of the French-speaking world;
- the historical context in which particular works were written and the relation between literature and other forms of cultural expression (e.g., art, philosophy, politics, religion);
- contemporary French culture, politics, and current events;
- a range of literary genres, their development and reception, and relevant critical methodologies; and
- the grammatical structure of modern standard French.

In addition, students completing the degree in French are expected to acquire the ability and skills to:

- speak and understand modern, spoken standard French sufficient for all purposes of daily life and for intellectual discussion in academic settings;
- read and write modern standard French with sufficient fluency and correctness for successful literary or linguistic analysis of French texts;
- analyze and interpret literary texts in terms of style, plot, structure, characters, themes, and the use of literary devices;
- communicate such analyses and interpretations simply in French or at a more sophisticated level in English, and discuss a wide range of topics concerning French culture, civilization, and current events; and
- follow with reasonable comprehension French broadcasts or film.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Students wishing to pursue an Honors major should also consult the Honors requirements listed below.

NOTE: Students undertaking a major in French should expect to have regular conferences with a college advisor to ensure that they are making adequate progress and that requirements are being met in a timely way. The department will not certify majors for graduation when a failure to satisfy requirements is the fault of the student.

A minimum of 30 upper-division hours in French must be completed (see below for specific courses). FREN 2120 or its equivalent is the prerequisite for admission to courses required for the major.

<i>Required Courses</i>	<i>Semester Hours</i>
FREN 3010 French Phonetics and Pronunciation . . . . .	3
FREN 3050, 3060 French Composition 1 and 2 . . . . .	6
FREN 3100 Critical Reading and Writing in French Literature . . . . .	3
FREN 3110, 3120 Main Currents of French Literature 1 and 2. . . . .	6
Four or more other courses at the 3000 or 4000 level, of which 9 hours must be at the 4100 level or above. . . . .	12
FREN 4990 Senior Seminar (including a senior essay and oral presentation, except where a student elects to present a senior honors thesis). NOTE: The seminar runs concurrently with one of the three courses taken at the 4100 level or above. See departmental brochure for details. . . . .	3

### Honors Requirements

Honors candidates must meet all of the regular requirements for the major plus the following:

FREN 3200 Introduction to Literary Theory . . . . .	3
One semester of independent study. Note: The semester of independent study is taken concurrently with FREN 4980, and is devoted to one-on-one work on the senior honors thesis with a faculty advisor. See department for details. . . . .	3

### Graduating in Four Years with a BA in French

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in French, students should meet the following requirements:

Declare French major by the beginning of the second semester of study. Complete FREN 3010, 3050, 3060, and 3100 by the end of the second (sophomore) year.

Complete FREN 3110 and 3120 and two other 3000- or 4000-level courses (including one at the 4100 level or above) by the end of the third (junior) year.

NOTE: Completion of French requirements includes the successful written and oral presentation of a senior essay or honors thesis by the end of the fourth (senior) year.

### Minor Program

A minor program is offered in French. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/arts\\_sciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/arts_sciences/students/undergraduate/academics/minors.html).

### Concurrent BA/MA Program in French

The department also administers a concurrent undergraduate and graduate degree program in French, offering students the opportunity to graduate with a BA and an MA in French in five years. Students interested in this program should consult a college advisor and the associate chair for graduate studies for details. Students should also read the relevant guidelines available in the main department office.

### Italian

The major provides the language skills (listening, speaking, reading, writing) of modern Italian needed for all purposes of daily life. Moreover, by combining courses offered by the faculty of the Department of French and Italian with courses of Italian interest taught in other units, including film studies, fine arts, and history, the program promotes an understanding of the role of the Italian literary and cultural tradition within western civilization at large. As the birthplace of Dante, Petrarca, Boccaccio, Ariosto, Tasso, Marino, Michelangelo, Raphael, and Da Vinci, Italy is the cradle of the Renaissance. Italy projects a powerful, formative influence into our own day through the work of 19th- and 20th century writers like Leopardi, Manzoni, Piran-

dello, Levi, and Calvino; operatic composers like Rossini, Puccini, and Verdi; philosophers and critics like Croce, d’Annunzio, Gramsci, and Ginzburg; and filmmakers like Fellini, Pasolini, and Bertolucci. Thus, in addition to supplying the necessary background for advanced professional study and specialization, the Italian major introduces students to a rich literary, artistic, and intellectual history at the roots of the modern world.

Students wishing to major in Italian are required to have a thorough advising session with the Italian program advisor. In this session the student program of study is outlined in detail. Students are required to see the advisor in the event that any of their major courses are canceled so that substitutions and revisions in their programs can be made. The department will not approve a major in Italian unless the student has been advised by the program advisor.

For courses in other departments with an Italian emphasis (e.g., comparative literature, fine arts, history, honors, etc.), see those sections.

The undergraduate degree in Italian emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Italian literature from the Middle Ages to the present;
- significant works of Italian literature and the contribution to world literature of Italian letters;
- the historical context in which particular works were written;
- contemporary Italian culture, politics, and current events;
- a range of literary genres, their development and reception, and relevant critical methodologies; and
- the grammatical structure of modern standard Italian.

In addition, students completing the degree in Italian are expected to acquire the ability and skills to:

- speak and understand modern, spoken, standard Italian sufficient for all purposes of daily life and for intellectual discussion in academic settings;
- read and write modern standard Italian with sufficient fluency and correctness for successful literary or linguistic analysis of Italian texts;
- analyze and interpret literary texts in terms of style, plot structure, characters, themes, and the use of literary devices;
- communicate such analyses and interpretations simply in Italian or at a more sophisticated level in English, and discuss a wide range of topics concerning Italian culture, civilization, and current events; and
- follow with reasonable comprehension authentic Italian broadcasts or film.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Thirty-six hours beyond the first year with a 2.00 (C) grade point average or better are required, as listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Italian Lower-division Required Courses . . . . .</b>	<b>.9</b>
ITAL 2110 Intermediate Italian Reading, Grammar, and Composition 1	
ITAL 2120 Intermediate Italian Reading, Grammar, and Composition 2	
ITAL 2130 Introduction to Literary Analysis	

<b>Italian 3000-level Required Courses . . . . .</b>	<b>12</b>
ITAL 3010 Advanced Composition and Conversation 1	

Choose one from the following two courses:

ITAL 3020 Advanced Composition and Conversation 2	
ITAL 3030 Storia dell’arte: Advanced Composition and Conversation 3	

Choose two from the following three courses (prereq. ITAL 2130):

ITAL 3140 Readings in Italian Literature: 20th Century

ITAL 3150 Readings in Italian Literature: 19th Century

ITAL 3160 Readings in Italian Literature: Medieval/Renaissance

**Italian 4000-level Courses** . . . . . 9

Students must take at least three 4000-level courses in the Italian department, of which one will be ITAL 4990, the Senior Seminar. Before registering for ITAL 4990, students must meet with the Italian advisor

**Upper-division Electives** . . . . . 6

Electives may be chosen from courses outside the Department of French and Italian, the content of which is consistent with the goals of the Italian major, and always in consultation with the major advisor. It is recommended that students select courses in diverse disciplines and time periods.

**Honors Requirements**

Honors candidates must meet all of the regular requirements for the major plus the following:

FREN 3200 Introduction to Literary Theory. NOTE: FREN 3200 is taught in English and presupposes no knowledge of French. . . . . 3

One semester of independent study. NOTE: The semester of independent study is taken concurrently with ITAL 4980, and is devoted to one-on-one work on the senior honors thesis with a faculty advisor. It does not run concurrently with required 4000-level courses. See departmental brochure for details. . . . . 3

**Graduating in Four Years with a BA in Italian**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Italian, students should meet the following requirements:

Declare the Italian major by the beginning of the second semester of study.

Complete 12 credit hours of requirements (including ITAL 2110 and 2120) by the end of the second (sophomore) year.

Complete 12 of the remaining 24 credit hours by the end of the third (junior) year.

Complete the remainder of the major requirements in the fourth (senior) year.

**Minor Program**

A minor program is offered in Italian. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

**Study Abroad**

CU-Boulder offers French study abroad programs in Annecy, Paris, Rennes, Strasbourg, and Toulouse, France. In addition, students may study in Quebec, Brussels, Geneva, and in the Francophone African nations of Cameroon, Madagascar, Mali, and Senegal. CU-Boulder offers Italian study abroad programs in Ferrara, Florence, and Perugia, Italy. Students may obtain course-credit equivalences for work done while abroad. For further information about study abroad programs, students may visit departmental advisors or the Office of International Education. CU-Boulder also supports a summer program in Italy that focuses on Italian history and culture in Rome. Credits earned on this program may be applied to the Italian major. Students may also take a summer film class in Rome and/or Paris (in alternate years). This class is taught in English. The Ayer Romance Language Scholarship is available for majors who plan to study abroad; it is awarded by the Department of French and Italian.

**Graduate Degree Programs in French**

Students wishing to pursue graduate work in French leading to candidacy for an advanced degree should read carefully Requirements for Advanced Degrees in the Graduate School section. A graduate teaching exchange at the University of Tours is available to students who have earned a master’s degree.

**Master’s Degree**

**Prerequisites.** The following are prerequisite to graduate study in French: the ability to read, write, speak, and understand spoken standard French; general knowledge of French literature and civilization; and ability to read one language in addition to English and French. This last requirement may be fulfilled by passing a reading examination offered by the department. See department guidelines for the specific requirements for the MA in French.

**Doctoral Degree**

**Prerequisites.** Doctoral candidates should possess excellence in reading, speaking, writing, and understanding spoken standard French; general knowledge of French literature and civilization; and knowledge of one language other than English and French (see below).

**Required Courses.** See department guidelines for PhD candidates.

**Language Requirement.** A sound reading knowledge of one modern language other than English and French is required. Such reading knowledge must be certified by the student passing a reading examination in the language. The examination normally consists of a timed translation of a literary text or a text dealing with literature (e.g., literary criticism). A dictionary is permitted. This language should be relevant to the student’s academic program.

**Geography**

**Degrees BA, MA, PhD**

The Department of Geography offers theoretical and practical work in physical geography, including climatology, geomorphology, and biogeography; conservation of natural resources, including environmental education; human geography, including urban, social, economic, political, cultural, and population geography; geographic information science (GIS), including spatial analysis using GIS, remote sensing, computer cartography, GIS and society, and geography education; and regional analysis, including mountains, natural hazards, and specific regional courses. To complement its curriculum, the department offers geography majors internship opportunities.

The Department of Geography offers BA, MA, and PhD degree programs in geography.

The undergraduate degree in geography emphasizes knowledge and awareness of:

- the unique contributions of the discipline to understanding the spatial components of problems and the diverse factors relating to human interaction with the environment;
- the spatial distributions of physical and human characteristics on the Earth surface, the general patterns these form, and the processes that have created and are changing these patterns;
- the major themes of geographical analysis, including absolute and relative location; human and physical characteris-



tics of place; human and environmental relations; movement of people, ideas, and products; and regionalization; and

- the general geographical principles of human-environment interaction, global change, and human spatial organization.

In addition, students completing the degree in geography are expected to acquire proficiency in:

- one or more of the specific geographic skill areas of cartography, remote sensing, and geographic information systems;
- writing, quantitative methods, computer literacy, and library and field methods of data collection; and
- identifying the geographic dimensions of a problem and analyzing, synthesizing, and evaluating relevant data, and applying geographic principles offering a geographic perspective on that problem.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Students must complete at least 32 and no more than 45 credit hours in geography courses with grades of C- or better (18 hours must be upper division). No pass/fail grades are allowed in the major. Transfer students majoring in geography must complete at least 12 credit hours of upper-division geography courses at CU-Boulder.

<i>Required Courses</i>	<i>Semester Hours</i>
GEOG 1001 Environmental Systems 1: Climate and Vegetation . . . . .	4
GEOG 1011 Environmental Systems 2: Landscapes and Water . . . . .	4
Two of the following:	
GEOG 1982 World Regional Geography . . . . .	3
GEOG 1992 Human Geographies . . . . .	3
GEOG 2002 Geographies of Global Change . . . . .	3
GEOG 2412 Environment and Culture . . . . .	3
Upper-division human geography course (GEOG 3**2 or GEOG 4**2).	
One of the following:	
GEOG 2043 Special Topics in Geography . . . . .	3
GEOG 2053 Mapping a Changing World . . . . .	4
GEOG 3053 Cartography 1: Visualization and Information Design . . . . .	4
One of the following:	
ANTH 4000 Quantitative Methods in Anthropology . . . . .	3
ECON 3818 Introduction to Statistics with Computer Applications . . . . .	4
GEOG 3023 Statistics for Earth Sciences . . . . .	4
GEOG 3093 Geographic Interpretation of Aerial Photographs . . . . .	3
GEOG 4023 Introduction to Quantitative Methods in Human Geography . . . . .	3
GEOG 4043 Cartography 2: Interactive and Multimedia Mapping . . . . .	4
GEOG 4083 Mapping from Remotely Sensed Imagery . . . . .	4
GEOG 4093 Remote Sensing of the Environment . . . . .	4
GEOG 4103 Introduction to Geographic Information Science . . . . .	4
GEOG 4173 Research Seminar . . . . .	3
GEOG 4203 Geographic Information Science: Modeling Applications . . . . .	4
GEOG 4383 Methods of Vegetation Analysis . . . . .	3
GEOG 4411 Methods of Soil Analysis . . . . .	3
MATH 2510 Introduction to Statistics . . . . .	3
PSCI 2074 Quantitative Research Methods . . . . .	3
PSYC 3101 Statistics and Research Methods in Psychology . . . . .	4
SOCY 2061 Introduction to Social Statistics . . . . .	3
SOCY 4061 Social Statistics . . . . .	3
Additional electives . . . . .	11-18

Students should consult the departmental office for further information and referral to departmental advisors.

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in geography, students should meet the following requirements:

- Declare a geography major by the beginning of the second semester.
- Complete GEOG 1001, 1011, and one of the following courses: GEOG 1982, 1992, 2002, or 2412, by the end of the third semester.
- Complete GEOG 1982, 1992, 2002, or 2412 or an approved upper-division human geography course (must be different than the course used to complete the previous requirement) and 9 credit hours of upper-division geography courses by the end of the sixth semester.
- Complete GEOG 2053 or 3053 by the end of the sixth semester.
- Complete the remaining upper-division credit hours by the eighth semester.

## Minor Program

A minor is offered in geography. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

## MAPS (Minimum Academic Preparation Standards)

To fulfill a MAPS deficiency in geography, students may take any one of the following courses: GEOG 1982, 1992, 2002, or 2412, or pass the Geography Exemption Exam. For more information on the exemption exam, contact Testing Services at 303-492-5854 or [careerservices.colorado.edu/testing.cs](http://careerservices.colorado.edu/testing.cs).

## Geography Honors Program

Students interested in participating in a special honors program should contact the departmental honors advisor during their junior year.

## Geography Internship Program

To complement its curriculum, the department offers geography majors internship opportunities in which students earn academic credit in GEOG 3930 Internship while working in selected positions in public agencies and firms.

## Residential Academic Program

Geography students specializing in environmental issues may want to consider the Baker Residential Academic Program. Students may visit the geography department office or refer to Residential Academic Programs, [www.colorado.edu/WRAP](http://www.colorado.edu/WRAP).

## Graduate Degree Programs

Students wishing to pursue graduate work in geography leading to candidacy for advanced degrees should read carefully the requirements for advanced degrees in the Graduate School section. Graduate-level course work at the Boulder campus may be combined with graduate courses offered at the Denver and Colorado Springs campuses. Additional information should be obtained from the Department of Geography. The following are departmental requirements.

## Master Degree

**Prerequisites.** For admission without deficiency and to meet the department mandatory requirements for a knowledge of basic geography, all entering graduate students are required to have the kind of knowledge presented in the department introductory courses in physical geography (GEOG 1001 Environmental Systems/Climate and Vegetation and GEOG 1011 Environmental

Systems/Landscapes and Water) and human geography (GEOG 1982 World Regional Geography, GEOG 1992 Human Geographies, GEOG 2002 Geographies of Global Change, and GEOG 2412 Environment and Culture). It is the responsibility of the student to obtain this knowledge as part of his/her preliminary exam. Students may gain the required knowledge by formally taking the introductory courses, by auditing the courses, by reading the textbooks, or by other means. This knowledge will enhance the student ability to perform at the level expected in the GEOG 5152–5161 core series. In addition to knowledge of basic geography, it is desirable that the student has course work in at least two areas outside geography in cognate fields in the social and natural sciences. Students are encouraged to have some background in college math, statistics, and computer skills.

**General Requirements.** The minimum requirements for an MA in geography may be fulfilled by completing 30 semester hours of graduate work, including a thesis, which carries up to 6 credit hours (i.e., 24 hours of course work at the 5000 level or above, plus a minimum of 4 but not more than 6 hours of thesis). Master students may, with the written approval of their advisor, use a maximum of 6 hours of 3000- or 4000-level course work to reach the required 30 hours.

**Doctoral Degree**

**Prerequisites.** The minimum requirements for admission to the PhD program are normally a master degree, significant published research, or equivalent standing.

**General Requirements.** The PhD degree is not conferred merely upon the satisfactory completion of a course of study. The candidate must also demonstrate proficiency in some broad subject of learning, and be able to critically evaluate work in the field, show the ability to work independently in the chosen field, and make an original contribution of significance to the advancement of knowledge.

The minimum requirements are 30 credit hours of course work numbered 5000 or above and 30 credit hours of dissertation. Ordinarily the number of course work hours and dissertation hours will be greater than 30 each. At least 20 of these hours must be taken at the University of Colorado; up to 10 credit hours from another institution may be transferred upon approval.

A 3.000 (B) average or higher must be maintained in all course work.

Six semesters of residence are required beyond the bachelor’s degree, of which four must be at the University of Colorado; this may include two semesters for the master degree. Students with a University of Colorado master degree in geography, with departmental approval, may apply all credit hours from 5000 or above courses (except thesis credits) to the PhD requirements.

**Geological Sciences**

*Degrees* ..... BA, MS, PhD

The options available in the undergraduate program in geological sciences are geology, geophysics, and environmental geosciences. Each option leads to the BA degree. All of these options provide a strong basis for understanding the functioning of the Earth system and a firm foundation for graduate study and professional employment. Students who are uncertain as to which option best suits their needs should contact a departmental advisor or faculty member. In all options, the undergraduate program emphasizes course work in theoretical, laboratory, and field-oriented aspects of the geological sciences. The nearby Rocky Mountains provide a natural laboratory for many of these courses.

Students interested in the geological sciences may also wish to consider the Baker Residential Academic Program. Students who do not wish to pursue a career in the geosciences, or who would like to combine a basic knowledge of geologic sciences with that of some other field, should consider using geological sciences as one subject in a distributed studies major or as a minor. Students who intend to pursue graduate study in the geological sciences are encouraged to consider developing an honor thesis as part of their undergraduate studies.

The three options available in the undergraduate major offer different focus areas of instruction. All three options offer excellent preparation for students interested in pursuing professional careers, or graduate study, in the geological sciences.

Each option emphasizes knowledge in:

- the ways in which Earth responds to internal and external forces; the physical, chemical, and biological evolution of Earth; and the nature of the materials of which the Earth is made
- the role of physics, chemistry, mathematics, and biology in understanding geological processes
- the history of discoveries and ideas that have contributed to our current knowledge of the Earth and the planetary system

The geology option is a traditional geology degree program that emphasizes the following:

- the mineralogy and petrology of igneous, metamorphic, and sedimentary rocks
- the processes of sedimentation and the applications of stratigraphy and paleobiology in the reconstruction of Earth history
- the role of geophysics and geochemistry in understanding the nature of Earth and its history
- the study of faults, folds, and other rock structures and the tectonic processes that create those structures
- the methods used in the field to map and interpret the diverse variety of rock types and structures

The environmental geoscience option emphasizes the following:

- the function of the integrated Earth system including the atmosphere, hydrosphere, biosphere, and geosphere
- the fundamental controls on surface Earth processes including energy balance, hydrology, geomorphology, geochemistry, and biogeochemistry
- the role of humans in the Earth system

The geophysics option emphasizes:

- applications of fundamental mathematical formulations and physical principles to an understanding of the Earth
- methods utilized to map and characterize those portions of the planet that lie below the surface, from just beneath our feet down to the core

<i>Required Courses</i>	<i>Semester Hours</i>
GEOG 4960 Writing in Geosciences . . . . .	1
CHEM 1113 and 1133 General Chemistry 1 and 2 and CHEM 1114 and 1134 Laboratory in General Chemistry 1 and 2 . . . . .	10
MATH 1300 and 2300 Analytical Geometry and Calculus 1 and 2 or APPM 1350 and 1360 Calculus for Engineers 1 and 2 . . . . .	8-10
PHYS 1110, 1120, and 1140 General Physics 1 and 2 and Experimental Physics 1 . . . . .	9

**Geology Option**

Students electing the geology option are required to take the following additional courses:

GEOL 1010 Introduction to Geology 1 . . . . .	3
GEOL 1020 Introduction to Earth History or GEOL 1040 Geology of Colorado or GEOL 1060 Global Change . . . . .	3
GEOL 2700 Introduction to Field Geology . . . . .	2
GEOL 3010 Introduction to Mineralogy . . . . .	3
GEOL 3020 Petrology. . . . .	3
GEOL 3120 Structural Geology . . . . .	4
GEOL 3320 Introduction to Geochemistry . . . . .	3
GEOL 3430 Sedimentology and Stratigraphy . . . . .	4
GEOL 4130 Principles of Geophysics . . . . .	3

Geology option students must also take courses from the following lists:

One from the following hydrogeosciences-focused courses:

GEOL 3030 Introduction to Hydrogeology . . . . .	3
GEOL 3820 The Fluid Earth . . . . .	3
GEOL 4060 Oceanography . . . . .	4

Two from the following advanced-field modules:

GEOL 4711 Igneous and Metamorphic Field Geology . . . . .	2
GEOL 4712 Structural Field Geology . . . . .	2
GEOL 4714 Field Geophysics . . . . .	2
GEOL 4715 Field Techniques in Hydrogeology . . . . .	2
GEOL 4716 Environmental Field Geochemistry . . . . .	2
GEOL 4717 Field Seminar in Geology and Tectonics . . . . .	2

One upper-division elective, any 3000-4000 GEOL course, except the following:

GEOL 3040 Global Change. . . . .	3
GEOL 3070 Introduction to Oceanography . . . . .	3
GEOL 3500 Earth Resources and the Environment. . . . .	3
GEOL 3520 Environmental Issues in Geosciences . . . . .	3
GEOL 3720 Evolution of Life: the Geological Records . . . . .	3
GEOL 3950 Natural Catastrophes and Geological Hazards . . . . .	3
GEOL 4080 Societal Problems and Earth Sciences . . . . .	3
GEOL 4500 Critical Thinking in Earth Sciences . . . . .	3

**Environmental Geoscience Option**

Students electing the environmental geoscience option are required to take the following additional courses:

GEOL 2001 Planet Earth . . . . .	4
GEOL 3230 Earth Materials . . . . .	3
GEOL 3320 Introduction to Geochemistry . . . . .	3

Environmental geoscience option students must also take courses from the following lists:

Two from the following water-focused courses:

GEOL 3030 Introduction to Hydrogeology . . . . .	3
GEOL 3820 The Fluid Earth . . . . .	3
GEOL 4060 Oceanography . . . . .	3

One from the following biogeochemistry-focused courses:

GEOL 4160 Biogeochemistry . . . . .	3
GEOL 4270 Marine Chemistry and Geochemistry . . . . .	3

One from the following climate-focused courses:

GEOL 4040 Paleoclimatology . . . . .	3
ATOC 3600 Principles of Climate . . . . .	3

One from the following advanced field courses:

GEOL 4711 Igneous and Metamorphic Field Geology . . . . .	2
GEOL 4714 Field Geophysics . . . . .	2
GEOL 4715 Field Techniques in Hydrogeology . . . . .	2
GEOL 4716 Environmental Field Geochemistry . . . . .	2
EBIO 4630 Field Techniques in Environmental Science . . . . .	2-6
EVEN 4100 Environmental Sampling and Analysis . . . . .	3

Four additional courses from the following upper-division electives (electives not already used to fulfill a different major requirement). Two of the four must be geology. Courses other than those listed below may be acceptable with advisor's permission:

GEOL 3023 Statistics for Earth Sciences . . . . .	4
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GEOL 3030 Introduction to Hydrogeology . . . . .	3
GEOL 3050 GIS for Geologists . . . . .	2
GEOL 3410 Paleobiology. . . . .	3
GEOL 3430 Sedimentology and Stratigraphy . . . . .	4
GEOL 3820 The Fluid Earth . . . . .	3
GEOL 4040 Paleoclimatology . . . . .	3
GEOL 4060 Oceanography . . . . .	4
GEOL 4093 Remote Sensing for the Environment. . . . .	4
GEOL 4130 Principles of Geophysics . . . . .	3
GEOL 4160 Introduction to Biogeochemistry . . . . .	3
GEOL 4241 Principles of Geomorphology . . . . .	4
GEOL 4270 Marine Chemistry and Geochemistry . . . . .	3
GEOL 4670 Isotope Geology. . . . .	3

**Water Focus**

CVEN 3454 Water Quality . . . . .	4
CVEN 4718 Mechanics and Dynamics of Glaciers . . . . .	3
EBIO 4030 Limnology . . . . .	3
GEOG 4321 Snow Hydrology . . . . .	3-4
GEOG 4251 Fluvial Geomorphology . . . . .	4
GEOG 4260 Glaciers and Permafrost . . . . .	3

**Biogeochemistry Focus**

EBIO 4060 Landscape Ecology . . . . .	3
EBIO 4570 Advanced Plant Physiological. . . . .	3
GEOG 4401 Soils Geography . . . . .	3
MCDB 4350 Microbial Diversity and the Biosphere . . . . .	3

**Climate Focus**

ATOC 4720 Atmospheric Physics and Dynamics. . . . .	3
ENVS/GEOG 4201 Biometeorology . . . . .	3

**Policy Focus**

ATOC 4800 Policy and Climate . . . . .	3
ECON 3403 International Economics and Policy . . . . .	3
ENVD 4023 Environmental Impact Assessment . . . . .	3
PSCI 4183 International Law . . . . .	3

**Geophysics Option**

Students electing the geophysics option are required to take the following additional courses:

GEOL 1010 Introduction to Geology 1 . . . . .	3
GEOL 1020 Introduction to Earth History or GEOL 1040 Geology of Colorado or GEOL 1060 Global Change . . . . .	3
GEOL 2700 Introduction to Field Geology . . . . .	2
GEOL 3010 Introduction to Mineralogy . . . . .	3
GEOL 3120 Structural Geology . . . . .	4
GEOL 3320 Introduction to Geochemistry or GEOL 3020 Petrology. . . . .	3
GEOL 4130 Principles of Geophysics . . . . .	3
GEOL 4714 Field Geophysics . . . . .	2
APPM 2360 Introduction to Linear Algebra with Differential Equations. . . . .	4
MATH 2400 Analytical Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers . . . . .	4
PHYS 2130 Gen Physics III or PHYS 2170 Foundations of Modern Physics . . . . .	3
PHYS 2210 Classical Mechanics and Mathematical Methods 1 . . . . .	3

Geophysics option students must also take courses from the following lists:

Two from the following:

PHYS 3210 Classical Mechanics and Mathematical Methods 2 . . . . .	3
PHYS 3310 Principles of Electricity and Magnetism . . . . .	3
MATH 4470 Partial Differential Equations or APPM 4350 Methods in Applied Mathematics . . . . .	3

Additional information on required courses and other departmental requirements may be obtained from the departmental office. Students should contact the department for a list of current major requirements.

Transfer students must satisfactorily complete a minimum of 12 credit hours of advanced work (3000-level or above) in the Department of Geological Sciences in Boulder if they wish to obtain a degree in geology from CU-Boulder. Before registering for the first time, or within the first week of the semester, such students must see a geological sciences department undergradu-

ate advisor to have previous course work in geology, math, and allied sciences evaluated.

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in geology, students should meet all college requirements plus specific departmental requirements. These departmental requirements vary slightly between the three major options. Detailed information is available from the department office, but in general these requirements include:

Declare a geology major and begin course work in the major during the first semester freshman year.

Meet with a departmental advisor prior to the second and fifth semesters and during the seventh semester.

Complete at least 33 credit hours (geology and environmental geoscience options; 44 credit hours for geophysics option) required for the major by the end of the fourth semester.

Complete at least 47 credit hours (geology and environmental geosciences options; 63 credit hours for geophysics option) required for the major by the end of the sixth semester.

Complete the remaining requirements for the major by the end of the eighth semester.

### *Minor Program*

A minor is offered in geology. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### *Geology Honors Program*

Opportunity is provided for qualified geology majors to participate in the geology honors program and graduate with honors (cum laude, magna cum laude, or summa cum laude) in geology. Students interested in the honors program should contact the departmental honors advisor during their junior year.

### **Graduate Degree Programs**

Students interested in graduate work in the geological sciences should carefully read the detailed information regarding admission, registration, and degree requirements that is available from the departmental office. A brief summary follows.

All students applying for admission must take the Graduate Record Examination. Results of this examination are used both for determining admittance and for initial academic counseling.

Entering students normally have completed at least 24 semester hours of basic courses in geological science and two semesters each of chemistry, physics, and calculus. In some cases, exceptional undergraduate preparation in other fields of science, mathematics, or engineering may substitute for part of the 24 hours in geological science.

Each student acquires a primary advisor and an advisory committee which provides guidance throughout the degree program.

### *Master's Degree*

Candidates for the master's degree in geological sciences must complete at least 24 credit hours of graduate course work plus a thesis (Plan I), or 30 credit hours of graduate course work without a thesis (Plan II). The Plan II program requires at least 3 hours of GEOL 6960 (Plan II Master's Research) under the supervision of the advisory committee. For both plans, at least

24 credit hours must be completed at the 5000 level or above. See Graduate School specifications for more information.

### *Doctoral Degree*

Candidates for the doctoral degree must complete at least 30 credit hours in course work numbered 5000 or above, of which at least 20 must be taken at CU-Boulder. In addition to course work, candidates must take a total of at least 30 hours of GEOL 8990 doctoral dissertation hours, with not more than 10 of these in any one semester and not more than 10 before the comprehensive examination is passed.

The Department of Geological Sciences participates in the interdepartmental PhD program in geophysics and hydrology. For more information about this program, see the Graduate School section.

## **Germanic and Slavic Languages and Literatures**

*Germanic Studies Degree*..... BA

*German Degree*..... MA

*Russian Studies Degree*..... BA

Undergraduate students may choose to major in either Germanic studies or Russian studies.

The major in Germanic studies is an interdisciplinary program focusing on study of the German language, its manifestations in history, and its usage in the current cultural and social context; the literary, artistic, and philosophical aspects of German culture in the past and the present; the major historical events and developments in Germany and its neighboring countries, and the current political institutions and dynamics in Germany within the broader European framework.

The undergraduate degree in Germanic studies emphasizes knowledge and awareness of:

- the fundamental outlines of German history and culture;
- the history of modern German literature, 1750 to the present;
- cultural developments in modern German-speaking Central Europe, such as the arts, the cinema, and architecture; and
- central issues such as the Nazi era and the Holocaust, the roles of women, German attitudes toward non-Germans, German culture after reunification, and their reflection in German literature, arts, and media.

In addition, students completing the degree in Germanic studies are expected to acquire the ability and skills to:

- read German at a level at which critical literary and cultural analyses can be performed;
- write and speak German sufficiently to participate in critical discussions and write critical essays; and
- speak and comprehend German sufficiently for all situations in daily life, especially the business and professional sectors of German life.

The major in Russian studies is an interdisciplinary program focusing on study of the current cultural and social context, and the literary, artistic, and historical aspects of Russian culture in the past and present. The aim of the language curriculum is to equip students to read, write, speak, and understand Russian on a level allowing communication with natives and other users of the language. Before registering for a course, students should consult with a departmental advisor concerning appropriate placement.

Students interested in Russian studies should consider a double major in order to increase their career opportunities. Prospective teachers might combine Russian studies with a major in another foreign language, while those preparing for a career in government, business, or social services should benefit from a combination of Russian studies and a social science or business major. Students structure their curriculum according to the departmental checklist for majors, in close consultation with a departmental advisor.

The undergraduate degree in Russian studies emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Russian literature and culture from the Middle Ages to the present day;
- the major Russian creative writers of the 19th and 20th centuries;
- the historical context of Russian literature and culture; and
- basic critical methodologies as they relate to the study of Russian literature.

In addition, students with a degree in Russian studies are expected to acquire the ability and skills to:

- comprehend contemporary Russian, written or spoken, to a degree permitting sophisticated analysis of cultural texts;
- analyze Russian literary texts and give a reasoned response to them in literate English; and
- write and converse in Russian at their own intellectual level.

## Bachelor's Degree Programs

### *Germanic Studies*

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

The major requirement in Germanic studies is 34 hours beyond GRMN 2010 (with grades of C- or above). Students design their own major in consultation with the undergraduate advisor and a faculty mentor. Completion of the following courses is required; at least 18 hours from the department must be upper division. Students who test out of GRMN 2020 are required to complete 33 hours.

#### **A. German Language Courses (13 semester hours minimum)**

Completion of the following German language courses or demonstration of third year proficiency: GRMN 2020 Intermediate German 2 (4 hours) or GRMN 2030 Intensive Intermediate German (5 hours), GRMN 3010 Advanced German 1 (3 hours), GRMN 3020 Advanced German 2 (3 hours), GRMN 4010 Advanced Grammar and Stylistics (3 hours). GRMN 4010 is required of all majors.

#### **B. German Culture, Literature, and Other Electives (21 semester hours)**

GRMN 4550 Senior Seminar (required and must be taken at CU-Boulder) and any six GRMN literature/culture courses. At least two of the six courses must be upper-division, and at least two must be in German. With the approval of the German program faculty advisor, one course from another department may be taken in lieu of one of the six courses, provided that the course has a direct link to German studies.

#### **I. Courses Taught in German**

GRMN 3030 Business German; GRMN 3110 German Literature from the Avant-garde to the Postmodern; GRMN 3120 German Literature from the Enlightenment to Expressionism; GRMN 3130 Issues in German Philosophy and Literature; GRMN 3140 Current Issues in German Literature; GRMN 3150 Issues in German Politics and Literature; GRMN 3520 Open Topics in the Cultural Context; GRMN 3900 Independent Study; GRMN 3930 Internship; GRMN 4330 The Age of Goethe; GRMN 4340 Seminar in German Literature; GRMN 4450 Methods of Teaching German. Students have the option of taking the exam *Zertifikat Deutsch als Fremdsprache* in GRMN 3020, the

*Zertifikat Deutsch für den Beruf (ZDfB)* in GRMN 3030, and the *Goethe-Zertifikat C1* in GRMN 4010.

#### **II. Courses Taught in English**

GRMN 1601 Germany Today; GRMN 1602 Metropolis and Modernity; GRMN 1701 Nature and Environment in German Literature and Thought; GRMN 2301 Inside Nazi Germany; GRMN 2501 20th-Century German Short Story; GRMN 2502 Representing the Holocaust; GRMN 2503 Fairy Tales of Germany; GRMN 2601 Kafka and the Kafkaesque; GRMN 2603 Moral Dilemmas in Philosophy and Literature; GRMN 3501 German-Jewish Writers; GRMN 3502 Literature in the Age of Goethe; GRMN 3503 German Film through WWII; GRMN 3504 Topics in German Film; GRMN 3505 The Enlightenment; GRMN 3513 German Film and Society, 1945–1989; GRMN 3514 German Film and Society after 1989; GRMN 3601 German Women Writers; GRMN 3702 Dada and Surrealist Literature; GRMN 4251 Marxism; GRMN 4253 Philosophy of Language; GRMN 4301 Gender, Race, and Immigration in Germany and Europe; GRMN 4501 Seminar: Literature in Cultural Context; GRMN 4502 Nietzsche: Literature, and Values; GRMN 4503 Issues in German Thought; GRMN 4504 Goethe's *Faust*; GSLL 3401 The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe.

#### **C. Required for Students in the Secondary Teacher Certification Program**

GRMN 4450 Methods of Teaching German; and GRMN 4460 High School German Teaching

Plus other requirements as stated by the School of Education

*NOTE: GRMN 4450 and 4460 can be taken only after full admission to the teacher education program in the School of Education.*

#### **Minor Program**

A minor is offered in Germanic Studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/germslav](http://www.colorado.edu/germslav).

#### **Certificate in International Engineering in German**

The purpose of this certificate is to provide engineering students training in language and culture, giving them skills necessary to work effectively with engineers in multinational teams and to succeed during overseas assignments in today's global marketplace. It is an indication to prospective employers that the students have a certain degree of proficiency in German language and an understanding of the culture. Visit [ecadw.colorado.edu/engineering/academics/international-german.htm](http://ecadw.colorado.edu/engineering/academics/international-german.htm) for more information.

#### **Study Abroad**

The department strongly recommends that all majors take part in study abroad. The university programs in Regensburg and Berlin provide a full year of study abroad. Two Berlin summer sessions are also offered. Please consult with the major advisor. For more information on study abroad programs, see [www.colorado.edu/oie](http://www.colorado.edu/oie).

#### **Nordic Studies (Scandinavian)**

Courses are offered in English on Nordic culture and civilization. Courses are also offered in Norwegian and/or Swedish language. The language courses satisfy arts and sciences language requirements for the BA and BFA degrees. In addition, this is an exchange program with Uppsala University in Sweden and with the University of Copenhagen in Denmark (DIS). A minor is offered in Nordic studies. Declaration for a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For specific requirements, contact the department or visit [www.colorado.edu/germslav/nordic/minor.htm](http://www.colorado.edu/germslav/nordic/minor.htm).

The summer program in Reykjavik, Iceland, is a two-week intensive offered through CU-Boulder's Study Abroad Program. It consists of lectures complemented by excursions in Reykjavik and surrounding areas, including visits to deCODE Genetics (a global leader in gene discovery), the Geothermal Resource Park at Svartsengi and the Blue Lagoon Spa, and a day trip to the glacier of Langjökull. Students receive 3 upper-division credit hours for SCAN 3201 Contemporary Nordic Society and Culture, which fulfills the core requirement for contemporary societies.

### Hebrew Studies

Hebrew language instruction is offered over six semesters at the beginning, intermediate, and advanced levels. By the end of this cycle students have a sound basis in Hebrew language production (spoken and written) and comprehension (oral and written). The Jewish literature and culture courses introduce students to Jewish literature, culture, and religion, and examine Jewish identity in the modern and contemporary worlds.

### Russian Studies

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

Completion of 38 hours from tracks A or B or 36 hours from Track C with grades of C- or better. (None may be taken as *pass/fail*.) At least 18 RUSS hours must be completed at the 3000 or 4000 level. Note: RUSS 1010 and 1020 will not be counted toward the 38/36 hours required for the bachelor's degree in Russian. RUSS 1010 and 1020 will not count toward the maximum of 45 hours in the major department. Students are required to structure their curriculum in close consultation with a departmental advisor.

Transfer credit must be approved by the department.

Students with advanced Russian language skills are strongly encouraged to meet with a departmental faculty advisor to discuss language placement. Students who have Russian language transfer credit and/or students who are Russian language native speakers may enter the program at the upper-division level, with faculty permission. Students with previous knowledge of Russian must take the placement exam no later than the end of the first week of classes. Students who place out of Russian language courses required for the major must replace the credits with additional course work in Russian studies. To meet this requirement the student may take available Russian courses from either major track approved by the departmental faculty advisor. Any substitutions to major course work must be pre-approved by the Russian faculty advisor.

*NOTE: Beginning or middle-level language course requirements may be met by transfer credit or by testing out of the course. Students who enter the program at the third-year level must complete at least 18 credit hours in residence in courses numbered 3000 or above with grades of C- or better. (None may be taken pass/fail.) Students who enter at and enroll in Russian language courses at the 3000- or 4000-level may not receive credit for lower-division Russian language courses, unless lower-division language course work was completed prior to registration for 3000- and 4000-level Russian language courses.*

#### Required Courses

#### Semester Hours

#### Track A: Russian Language and Culture

RUSS 2010 Second-Year Russian I . . . . .	4
RUSS 2020 Second-Year Russian 2 . . . . .	4
RUSS 3010 Third-Year Russian 1 . . . . .	3
RUSS 3020 Third-Year Russian 2 . . . . .	3
RUSS 4010 Advanced Conversation and Composition 1 . . . . .	3
RUSS 4020 Advanced Conversation and Composition 2 . . . . .	3
RUSS 2211 Introduction to Russian Culture or RUSS 2221 Introduction to Modern Russian Culture, or RUSS 3601 Russian Culture Past and Present . . . . .	3
RUSS 3000 Advanced Conversation or RUSS 3050 Business Russian or upper-division study abroad Russian language course . . . . .	3
RUSS 4210 Open Topics: Russian Literature and Culture or RUSS 4230 Russian Cultural Idioms or RUSS 4851 Russian Film and Society . . . . .	3
RUSS 4811 19th Century Russian Literature . . . . .	3

RUSS 4821 20th Century Russian Literature and Art . . . . .	3
One 2000–4000-level Russian course . . . . .	3

#### Track B: Russian Culture and Literature

RUSS 2010 Second-Year Russian I . . . . .	4
RUSS 2020 Second-Year Russian 2 . . . . .	4
RUSS 2211 Introduction to Russian Culture or RUSS 3601 Russian Culture Past and Present . . . . .	3
RUSS 2221 Introduction to Modern Russian Culture or RUSS 3601 Russian Culture Past and Present . . . . .	3
RUSS 3301 Contemporary Issues in Russian Film or RUSS 4471 Women in 20th Century Russian Culture or RUSS 3211 History of Russian Cinema . . . . .	3
RUSS 3502 Ideals and Values in Modern Russia or RUSS 4221 Cultural Mythologies of Russian Communism or RUSS 4301 American-Russian Cultural Relations . . . . .	3
RUSS 4811 19th Century Russian Literature . . . . .	3
RUSS 4821 20th Century Russian Literature and Art . . . . .	3
Any two of the following courses:	
RUSS 4421 Gogol . . . . .	3
RUSS 4431 Dostoevsky . . . . .	3
RUSS 4441 Tolstoy . . . . .	3
RUSS 4451 Chekhov . . . . .	3
RUSS 4831 Contemporary Russian Literature . . . . .	3
RUSS 4861 Absurd and Supernatural in Russian Literature . . . . .	3
GSSL 3401 The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe . . . . .	3
One 3000-level Russian language course (3000, 3010, 3020, or 3050) . . . . .	3
One 2000–4000-level RUSS course . . . . .	3

#### Track C: Russian Major for Heritage Speakers (36 hours)

Students who are native speakers of Russian (speak or spoke Russian at home while growing up) and/or who attended school in Russian in the former Soviet Union for one or more years when their family lived in the former Soviet Union, may be eligible for a special major track for heritage speakers. Heritage speakers of Russian who wish to major in Russian should speak with the advisor for the Russian major to map out the specific plan for their major. The Heritage Speaker track requires 36 credits as follows:

RUSS 3060 Russian for Heritage Speakers I . . . . .	3
RUSS 4060 Russian for Heritage Speakers II . . . . .	3
RUSS 4210 Open Topics: Russian Language and Culture or RUSS 3050 Business Russian or upper-division study abroad Russian language class . . . . .	3
RUSS 4230 Russian Cultural Idioms or RUSS 4851 Russian Film and Society . . . . .	3
RUSS 2211 Introduction to Russian Culture or RUSS 3601 Russian Culture Past and Present . . . . .	3
RUSS 2221 Introduction to Modern Russian Culture or RUSS 3601 Russian Culture Past and Present . . . . .	3
RUSS 3211 History of Russian Cinema or RUSS 3301 Contemporary Issues in Russian Film or RUSS 4471 Women in 20th Century Russian Culture . . . . .	3
RUSS 3502 Ideals and Values in Modern Russia or RUSS 4221 Cultural Mythologies of Russian Communism or RUSS 4301 American-Russian Cultural Relations . . . . .	3
RUSS 4811 19th Century Russian Literature . . . . .	3
RUSS 4821 20th Century Russian Literature and Art . . . . .	3
RUSS 2231 Fairy Tales of Russia or RUSS 2471 Russian Women: From Folklore to 19th Century . . . . .	3
Any one of the following courses:	
RUSS 4221 Gogol	
RUSS 4431 Dostoevsky	
RUSS 4441 Tolstoy	
RUSS 4451 Chekhov	
RUSS 4831 Contemporary Russian Literature	
RUSS 4861 Absurd and Supernatural in Russian Literature	
GSSL 5352 Russian Novel: Theory and Practice	

### Language Placement

One year of high school Russian is usually considered equivalent to one semester of college Russian. Thus, a student with two years of high school Russian should enroll in RUSS 2010. Students who think that they should be placed at a level different from the normal one should consult the department for advice. Placement level is determined in consultation with the department and should be done before registration.

### Minor Program

A minor is offered in Russian Studies. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/germslav](http://www.colorado.edu/germslav).

### Study Abroad

The department strongly recommends that all Russian majors take part in the university summer language program in St. Petersburg. For more information on CU Study Abroad programs, see [www.colorado.edu/oie](http://www.colorado.edu/oie).

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Germanic or Russian studies, students should meet the following requirements:

Begin to study the language in the freshman year, or have received AP credit. In consultation with the major program advisor before the end of the drop/add period in the first semester, plan a tentative schedule of courses to be taken over eight semesters.

Discuss progress toward the degree each semester with the major advisor.

*Note: Although these requirements apply only in cases in which students are seeking to graduate under the terms of the four-year guarantee, they are good advice for all majors. Consult the program advisor about the major at any time.*

### Courses Taught in English

A number of courses are offered in translation. These courses generally require no previous study in the language, history, or culture of the area involved, and are open to all interested students, regardless of major.

### Concurrent BA/MA Program in Germanic Studies

Highly motivated undergraduates majoring in Germanic studies at CU-Boulder have the opportunity to enter a BA/MA program, thereby earning both the BA and the MA in five years. The concurrent degree program offers a unique academic credential designed to produce skilled graduates for a variety of occupations. In most cases, students must make written application no later than April 1 of the sophomore year. A minimum GPA of 3.25 for all courses is required, as well as three letters of recommendation indicating strong potential for advanced, intensive work in German. The recommended track requires a total of 58 hours of courses, with graduate courses in the fourth and fifth years only. Students should have completed most of their MAPS/core requirements (at least 30–37 hours) by the end of the sophomore year. Only CU-Boulder students may apply. For specific requirements please contact the department or see [www.colorado.edu/germslav](http://www.colorado.edu/germslav).

### Master’s Degree in German

Students wishing to pursue the interdisciplinary master’s in German should read carefully Requirements for Advanced Degrees in the Graduate School section. The following prerequisites and requirements apply: BA or equivalent in German or BA-level proficiency in German with a BA in a related field; general knowledge of the German-speaking countries’ literature, history, and culture; 24 hours of approved course work and a master’s thesis (6 hours), or 30 hours of course work without thesis; and reading knowledge of one modern foreign language in addition to German and English, to be demonstrated by approved course work or by examination. For specific requirements please contact the department or see [www.colorado.edu/germslav](http://www.colorado.edu/germslav).

### Master’s Degree in German/ Master’s of Business Administration

To support the university’s mission of advancing knowledge across disciplines, the Leeds School of Business and the Department of Germanic and Slavic Languages and Literatures offer a dual degree, Master of Business Administration and Master of Arts in German Studies. In most cases, students should be able to complete the dual degree in three years with a total of 70 credit hours. Prospective students must apply to and meet the application and admission requirements for each program separately. See the Department of Germanic and Slavic Languages and Literatures for application to the German MA program, and the Leeds School of Business to apply to the MBA program.

### History

*Degrees* ..... BA, MA, PhD

The undergraduate degree in history emphasizes knowledge and awareness of:

- the main topics in the political, social, cultural, and economic history of the United States, from its origins to the present;
- the main topics in the political, social, cultural, and economic history of western civilization, from its origins in antiquity to the present;
- the main topics in the political, social, cultural, and economic history of one or more geographic areas outside Europe and America; and
- methodology in historical studies.

In addition, students completing the degree in history are expected to acquire the ability and skills to:

- research and conduct an investigation, consulting appropriate works for developing a bibliography;
- distinguish between primary and secondary sources, analyze arguments and interpretations, and recognize interpretative conflicts;
- interpret evidence found in primary sources and develop an historical argument based on and sustained by the evidence available; and
- produce historical essays that are coherent, cogent, and grammatically correct.

### Bachelor’s Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

(NOTE: These requirements took effect at the beginning of the 2009 summer term. Students who became history majors prior to that term may fall under previous major requirements and should consult one of the department's undergraduate advisors to determine which requirements to follow. Students should take no more than 45 hours in history without consulting a history advisor to determine the applicability toward the BA degree. Students completing an Honors Thesis may take up to 51 hours in history.)

*Required Courses* *Semester Hours*  
**Total Hours:** Students must complete 36 hours in history courses with grades of C- or better. Of those 36 hours, 21 must be at the upper division.

**Lower-division Requirements** . . . . . 3  
 Complete one of the following 1000-level world areas history courses: . . . . . 3  
 HIST 1038 Introduction to Latin American History, HIST 1108 Introduction to Jewish History, HIST 1208 Sub-Saharan Africa to 1800, HIST 1308 Introduction to Middle Eastern History, HIST 1408 Introduction to South Asian History, HIST 1608 Introduction to Chinese History, or HIST 1708 Introduction to Japanese History  
 Complete one of the following 1000-level European history courses . . . . . 3  
 HIST 1010 Western Civilization 1 or HIST 1020 Western Civilization 2  
 Complete one of the following 1000-level United States history courses . . . . . 3  
 HIST 1015 History of the United States to 1865 or HIST 1025 History of the United States since 1865

**Upper-division Requirements** . . . . . 3  
 Complete one 4000-level world areas history course . . . . . 3  
 Complete one 4000-level Europe history course . . . . . 3  
 Complete one 4000-level United States history course . . . . . 3  
 Complete either two 4000-level history electives and HIST 4020 (Option 1), or complete a second 4000-level course from each of the three geographic areas (Option 2) . . . . . 9  
 Complete one 3000-level critical thinking senior seminar. . . . . 3  
 Any additional 3000-level seminars can be used to fulfill requirements that normally are fulfilled by 4000-level courses.

**Lower- or Upper-division Electives**  
 Complete any two other history courses . . . . . 6  
 These two courses can be taken at any level, but only one can be a 2000-level course.

**Historical Period**  
 Included in the 36 hours earned to complete the major requirements must be 6 hours in courses whose focus falls primarily before 1800 and 6 hours in courses whose focus falls primarily after 1800. Courses used to fulfill this requirement must also fulfill one of the previously listed requirements. (The department maintains a list of courses broken down by geographic areas and historical periods.)

**Ancillary Written Communication Requirement**

In addition to the history requirements listed above and a minimum of 36 credits in history, students must complete two writing courses with a C- or better, one each from the two lists of courses under the following Written Communication core requirements.

Lower-division Written Communication: . . . . . 3-4  
 ARSC 1080 College Writing and Research, ARSC 1150 Writing in Arts and Sciences, ENGL 1001 Freshman Writing Seminar, WRTG 1100 Extended First-Year Writing and Rhetoric, WRTG 1150 First-Year Writing and Rhetoric, WRTG 1250 Advanced First-Year Writing and Rhetoric, or any course that fulfills the upper-division Written Communication core requirement.  
 Upper-division Written Communication: . . . . . 3  
 WRTG/NRLN 3020 Topics in Writing or one of the following acceptable alternative upper-division writing classes: ARSC 3100 Multicultural Perspectives and Academic Discourse, ENV5 3020 Advanced Writing in Environmental Studies, HONR 3220 Advanced Honors Writing Workshop, PHIL 3480 Critical Thinking and Writing in Philosophy,

RLST 3020 Advanced Writing in Religious Studies, WMST 3800 Advanced Writing in Feminist Studies, or WRTG 3007 Writing in the Visual Arts.

NOTE: Under normal circumstances, no more than 45 credit hours in history may be used toward a student's total University of Colorado graduation requirements. Students must have a grade point average of at least 2.00 in the major in order to graduate. Students may receive credit for HIST 1020 and/or HIST 1025 by obtaining a score of four or better on the high school Advanced Placement history test(s). Some types of International Baccalaureate credit are acceptable; consult one of the major advisors to determine individual applicability. The CLEP test is not accepted for credit.

All students majoring in history must complete at least 12 credit hours of upper-division history in courses taught by the University of Colorado at Boulder faculty. In addition, the 3000-level critical thinking seminar and HIST 4020 (if taken) must be successfully completed on the CU-Boulder campus with a C- or better.

**Graduation in Four Years**

Students should consult the Four-Year Guarantee Requirements for further information on eligibility for the four-year guarantee. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in history, students must consult a history advisor each semester, but the following plan provides a rough outline of acceptable progress:

Declare the major no later than the second semester of the freshman year. Recommended sequence of courses:

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year.</b> . . . . .	<b>total 9</b>
Any two of the three required 1000-level HIST courses. . . . .	6
The ancillary lower-division Written Communication course . . . . .	3
<b>Sophomore Year.</b> . . . . .	<b>total 9</b>
The remaining required 1000-level HIST course . . . . .	3
Two 1000-level elective HIST courses or one 1000-level elective HIST course and one 4000-level HIST course . . . . .	6
<b>Junior Year.</b> . . . . .	<b>total 12</b>
Three 4000-level HIST courses . . . . .	9
The ancillary upper-division Written Communication course . . . . .	3
<b>Senior Year</b> . . . . .	<b>total 12</b>
Three 4000-level HIST courses, one of which may be HIST 4020 Capstone: Comparative History. . . . .	9
One 3000-level Senior Seminar. . . . .	3
<b>Grand total all terms</b> . . . . .	<b>42</b>

**Graduate Degree Programs**

Students wishing to pursue graduate work in history leading to candidacy for an advanced degree should read carefully requirements for advanced degrees in the Graduate School section. The following are special departmental requirements. Additional information should be obtained from the Department of History.

**Admission Requirements.** For purposes of admission to the graduate program, the general Graduate Record Examination is required and a score in the 85th percentile or above on the verbal component is generally expected.

**Master's Degree**

**Prerequisites.** As general preparation for graduate work in history, a broad liberal arts education, as well as a major in history, are desirable, though not specifically required. Candidates for graduate degrees may be required to pursue such fundamental courses in history as the department deems necessary to provide a suitable historical background.



**Residence.** While it is possible to obtain the MA degree in two full semesters of residence, more time is generally necessary.

**Degree Requirements.** A total of 24 credit hours of course work plus 6 hours of MA thesis, or 30 credit hours of course work without a thesis, is required for the degree. A comprehensive examination must be passed in the field of study before the degree is granted.

**Doctoral Degree**

**Prerequisites.** Students who wish to work toward the PhD degree in history must indicate knowledge of certain fields of history, acquaintance with the fundamental tools of historical scholarship, and the ability to do original work. The PhD program does not require the completion of a master’s degree, but directly admits those qualified applicants who hold an undergraduate history degree or who have completed appropriate undergraduate history preparation and who have been recommended by the graduate admissions committee.

**Residence.** At least three years of graduate study, two of which must be spent in residence, are required for the PhD degree.

**Degree Requirements.** A total of 45 postbaccalaureate credit hours, at least 30 of which must be taken at this university, and a dissertation are required for the degree. A minimum of one foreign language is required; however, students must be able to use those languages essential to research and advanced study in their respective fields.

A comprehensive written and oral examination, a dissertation which is an original contribution to knowledge, and an oral examination on the dissertation must be successfully completed.

**Humanities**

Degree ..... BA

**Bachelor’s Degree Program**

Humanities is an interdepartmental major that offers an interdisciplinary and comparative approach to the study of the arts within their historical and cultural context. As a direct result of its encouragement of interdisciplinary approaches to the analysis and interpretation of literature, music, film, art, and modern media, humanities offers an opportunity for students and faculty to pursue a wide variety of modes of reflection.

Humanities is committed to a profoundly comparative perspective enabling students and faculty to bring together not only different arts, but works drawn from different eras and cultures, Western and non-Western alike. At the same time as it uses historical and generic categories as a means of organizing material, it also provides an opportunity for critically examining these categories, sometimes challenging them, at other times bringing their latent content more fully to light.

The undergraduate degree in humanities emphasizes knowledge and awareness of:

- the ways cultures and traditions define both themselves and each other;
- the formal, rhetorical, and ideological properties of cultural texts in a variety of forms and media (literature, history, philosophy, film, music, visual arts, architecture, dance, theatre, performance);
- the dynamic relations between texts and their social and historical contexts;
- the genres and modes of texts and their production, transformation, and reception; and

- the theoretical and ideological underpinnings and implications of one’s own and others’ interpretive approaches and assumptions.

In addition, students completing the degree in humanities are expected to acquire the ability and skills to:

- analyze and interpret texts in a variety of forms and media;
- articulate such analyses and interpretations at a sophisticated level in both written and oral form;
- discern similarities and differences among individual works, artistic media, historical periods, and cultural traditions;
- reason critically; and
- explore the connections between contemporary issues and academic work.

<i>Required Courses</i>	<i>Semester Hours</i>
HUMN 1010 and 1020 Introduction to Humanities 1 and 2 . . . . .	12
HUMN 2000 Methods and Approaches to the Humanities . . . . .	3
Upper-division humanities courses . . . . .	15
Area of concentration: either a single language/literature (English or a foreign language, ancient or modern; first-year language courses may not be counted) or a field related to the humanities, such as history, art history, anthropology, etc. . . . .	18
(At least 12 of these 18 hours must be taken at the upper-division level.)	
Secondary field: courses chosen from one other humanities-related discipline such as fine arts, music, dance, theatre, film, philosophy, foreign language literature (first-year language courses may not be counted), or other discipline . . . . .	12

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. Because the humanities department is unique in requiring courses from a number of different departments in addition to its own courses, it is imperative that students wishing to graduate in four years declare the major early and meet regularly with a departmental advisor. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in humanities, students should meet the following requirements:

- Complete the lower-division sequence HUMN 1010–1020 by the end of the fourth semester.
- Complete at least two lower-division courses in the secondary field and/or area of concentration by the end of the fourth semester.
- Complete 15 of the remaining 42 credit hours at the upper-division level by the end of the sixth semester—at least two of these must be upper-division humanities courses.
- Complete all remaining required courses (no more than 27 credits) by the end of the eighth semester.

**Integrative Physiology**

Degrees ..... BA, MS, PhD

Physiology is the field of biology that deals with function in living organisms. The academic foundation of the department is the knowledge of how humans and animals function at the level of genes, cells, organs, and systems. Our multidisciplinary curriculum requires students to take foundational courses in anatomy, biochemistry, mathematics, physics, physiology, and statistics. With this basic knowledge, students can undertake a flexible curriculum that includes the study of biomechanics, cell physiology, comparative physiology, endocrinology, immunology, exercise physiology, and neurophysiology. The department also encourages student participation in research.

Students completing a degree in integrative physiology are expected to acquire the ability and skills to:

- Read, evaluate, and synthesize information from the research literature on integrative physiology;
- Observe living organisms and be able to understand the physiological principles underlying function;
- Be able to interpret movement and performance data from laboratory equipment; and
- Communicate the outcome of an investigation and its contribution to the body of knowledge on integrative physiology.

These goals are achieved by providing a curriculum that comprises required courses and elective experiences. The required courses establish the foundation of knowledge for the discipline, whereas the elective courses provide opportunities to extend this knowledge on selected topics. The elective courses include seminars, critical thinking classes, independent study, and research projects on such topics as applied exercise science, biochemical basis of performance, cellular and systemic cardiovascular physiology, comparative physiology of exercise, developmental neurobiology, ecophysiology, environmental and comparative endocrinology, genetics of substance abuse, mechanics and neural control of locomotion, molecular behavioral genetics, molecular neurogenetics, motor behavior, neurophysiology of movement, neuroimmunophysiology, reproductive endocrinology, sleep and chronobiology, and vascular biology. More detailed information is available at [www.colorado.edu/intphys](http://www.colorado.edu/intphys).

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses below.

<i>Required Courses</i>	<i>Semester Hours</i>
A grade must be earned of C- or better.	
IPHY 2800 Introduction to Statistics . . . . .	4
IPHY 3410 Introduction to Human Anatomy with IPHY 3415 Introduction to Human Anatomy Lab and IPHY 3470 Human Physiology 1 and IPHY 3480 Human Physiology 2 and IPHY 3435 Human Physiology Lab . . . . .	13
EBIO 1210-1240 General Biology 1 and 2 with labs or MCDB 1150 and 1151 Introduction to Molecular Biology with lab and MCDB 2150 and 2151 Principles of Genetics with lab . . . . .	8
CHEM 1113/1114 and 1133/1134 General Chemistry 1 and 2 with labs . . . . .	10
PHYS 2010 and 2020 General Physics 1 and 2 . . . . .	10
One of the following courses: MATH 1300 Analytic Geometry and Calculus 1, MATH 1310 Calculus 1 with Computer Applications, or APM 1350 Calculus 1 for Engineers . . . . .	4-5
Three of the following six courses: IPHY 3060 Cell Physiology, IPHY 4600 Immunology, IPHY 4440 Endocrinology, IPHY 4540 Biomechanics IPHY 4650 Exercise Physiology, and IPHY 4720 Neurophysiology . . . . .	12-14

The number of major elective hours needed to reach the 30 hour major requirement will vary based on what major courses are taken. Students cannot apply more than 45 major hours toward the degree. Contact department for current elective choices.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in integrative physiology, students should meet the following requirements:

Declare the major by the first semester.

Complete the biology and chemistry requirements before the beginning of the fifth semester.

Complete the anatomy and physiology requirements by the end of the sixth semester.

Students must consult with a major advisor to determine adequate progress toward completion of major requirements.

### Concurrent BA/MS Program

The Department of Integrative Physiology has developed a curriculum that results in simultaneously conferring BA and MS degrees following a five-year course of study. The program has been designed to provide qualified undergraduate students with an opportunity to enhance their knowledge base in the discipline, engage in research, increase their opportunities for employment, and make their applications to medical/allied health professional schools more competitive. Candidates for the program are recruited from the undergraduate population of declared integrative physiology majors during the beginning of their junior year. All interested candidates must apply by October 15. Decisions regarding acceptance into the program will be made by November 15. To apply, students must have a minimum GPA of 3.30 and one letter of recommendation. Approximately 5–10 of the applicants will be selected on a competitive basis to begin the program.

Once accepted into the program, a student must maintain a GPA of 3.00 in all course work undertaken. By the completion of their senior year, students must have completed the 114 undergraduate credits as outlined in the concurrent degree plan options. Continuing students must register for at least 5 graduate course credits per semester, beginning with the fall semester of their senior year. Students deciding to discontinue the program may do so at any time during their course of study. All credits completed toward the concurrent degree program will be counted toward the completion of the requirements for a BA degree in integrative physiology.

The curriculum for all students in the first year of the program is the same and is designed for students to complete their undergraduate requirements (114 credit hours) and 8 of their graduate credits. To complete the program in 5 years, students will be allowed to count 6 credits of their graduate work as electives for the undergraduate degree and 6 prespecified credits of undergraduate work toward the master's degree. See the section on Master of Science Degree below for more information.

### Graduate Degree Programs

To obtain materials for application and for any additional information, visit the departmental website at [www.colorado.edu/intphys/grad](http://www.colorado.edu/intphys/grad).

Entering graduate students must have an undergraduate preparation equivalent to the basic core curriculum requirements in integrative physiology at the University of Colorado or departmental approval of their academic preparation for graduate study.

All graduate applicants must have an introductory course in statistics or research design. In addition, students should have the knowledge base that would be obtained by completing three of the following six courses:

IPHY 3060 Cell Physiology . . . . .	4
IPHY 4440 Endocrinology . . . . .	4
IPHY 4540 Biomechanics . . . . .	5
IPHY 4600 Immunology . . . . .	4
IPHY 4650 Exercise Physiology . . . . .	5
IPHY 4720 Neurophysiology . . . . .	4

Satisfactory scores on the Graduate Record Examination tests are also required for admission to the department. These scores should be submitted at the time of application.

**Deficiencies.** If the undergraduate preparation of a prospective graduate student is not adequate, the student may be allowed to pursue graduate study with the understanding that identified deficiencies will be completed. The graduate admissions committee will determine the nature and extent of these deficiencies.

Deficiencies in any area of the undergraduate major may be met by completing approved course work in the subject at CU-Boulder or at other institutions. All entering graduate students with deficiencies must satisfy at least one deficiency per semester until all deficiencies are satisfied. Graduate courses taken before removing deficiencies may be accepted for graduate degree credit only if prior approval of the graduate coordinator has been granted.

### *Master of Science Degree*

Master's candidates entering the graduate program may select Plan I (thesis—30 credit hours, including 4-6 thesis hours), Plan II (nonthesis—30 credit hours including a 3-credit hour research project), or Plan III (course work only) for the degree program. Prior to or during their first academic year in the program, students should identify a graduate faculty member who will serve as their scholarly mentor for the development of a thesis or research project (Plan I or II). The scholarly mentor assists the student in deciding upon the thesis and nonthesis options based upon a careful examination of the candidate's academic record, the goals of the candidate, and the availability of departmental resources.

**Basic Requirements.** The following are required of all students for the master's of science degree: IPHY 5100 Colloquium in Integrative Physiology and IPHY 5800 Advanced Statistics and Research in Integrative Physiology, a minimum cumulative GPA of 3.00 in all graduate work undertaken, satisfactory performance on the comprehensive exam, and completion of the requirements for advanced degrees as stipulated by the Graduate School. For students enrolled in Plan I, IPHY 6950 Master's Thesis is required; for students enrolled in Plan II, IPHY 6840 Research Project is required.

**Comprehensive Examination.** Candidates are required to complete an oral examination covering the thesis (Plan I) or a written summary of the research project (Plan II).

### *Doctoral Degree*

**Basic Requirements.** Doctoral students must complete 30 credit hours of course work at or above the 5000 level and 30 semester hours of dissertation research (IPHY 8990). The following are required of all doctoral degree students: IPHY 5100 Colloquium in Integrative Physiology (2 academic year semesters); IPHY 5800 Advanced Statistics and Research in Integrative Physiology; IPHY 6830 Professional Skills for the Research Scientist; satisfactory completion of the department preliminary review; and satisfactory completion of both the comprehensive and final examinations.

**Advisory Committee.** The advisory committee consists of the student's mentor, a faculty member in the student's interest area, and either the department graduate coordinator or the department chair. The committee assists the student in planning a program of study.

**Preliminary Review.** After the first academic year, usually consisting of 18–20 hours of course work, the student completes the preliminary review process. This process is performed by the student's advisory committee. The preliminary evaluation includes an evaluation of the student's academic status (GPA of at least 3.00 required), a detailed proposal of the student's

curriculum, written input from the student's mentor, and other pertinent materials deemed necessary by the committee.

The outcome of the preliminary review process can be one of three judgments: pass, fail, or probation. A student who passes may continue to pursue the doctoral degree. A student who fails may not continue in the doctoral program. A student on probation must complete any deficiencies determined by his or her committee before continuing to pursue the doctoral degree.

**Comprehensive Examination.** The comprehensive exam will be administered to the student within four semesters of entry into the doctoral program. The format of the exam, and the composition of the comprehensive exam committee, will be determined by the mentor in consultation with the student. The examination will be based on a document that is about 20 pages in length and designed to demonstrate the student's comprehensive knowledge on a topic. The membership of the committee (a minimum of five members) is submitted to the dean of the Graduate School for approval. Students are given two opportunities to pass the comprehensive exam. The written portion of the exam is based upon the student's course work and requires demonstration of broad-based knowledge in integrative physiology. Specific areas to be evaluated are determined by the mentor and the student.

**Dissertation.** Successful completion of the comprehensive exam advances the student to doctoral candidate status, and the student may then begin a dissertation. All students must complete a formal written dissertation that conforms to the requirements established by the Graduate School at the University of Colorado at Boulder.

**Final Examination.** After completion of the dissertation, a final examination is scheduled. The exam consists of a written submission of the dissertation work and an oral defense. The final examination committee consists of at least five members, one of whom must be from outside the department. Three of the members must be Boulder campus resident faculty.

## **International Affairs**

*Degree* ..... BA

Our major requirements have been updated, effective summer 2009. Students who declared the IAFS major before summer 2009 have the option of using the current catalog plan, described below, or the old plan to fulfill graduation requirements. The new and old plans are available at [iafs.colorado.edu](http://iafs.colorado.edu). With the increasing importance of world issues to the United States, employment opportunities in government, international organizations, and business have expanded enormously. Today there is an urgent need for college graduates with a strong background in international affairs. To meet this need, the University of Colorado offers a comprehensive and flexible interdisciplinary program in international affairs leading to the BA degree.

The undergraduate degree in international affairs emphasizes knowledge and awareness of:

- major political, economic, social, and cultural problems facing the international community, including international economic relations, world population, and resource utilization
- the international political system in the broadest global context, international organizations and alliances, and foreign political systems and processes
- ethical issues involved in international relations

- patterns of conflict and cooperation among nations and peoples
- chief historical factors that give rise to existing international institutions and processes
- problems and issues in United States foreign policy

In addition, students completing the degree in international affairs are expected to acquire the ability and skills to:

- analyze an international problem from a political, economic, historical, and cultural perspective
- read, critically evaluate, and synthesize information obtained from international affairs literature
- analyze international phenomena critically so as to separate the essential from the irrelevant and identify the probable
- communicate, orally and in writing, findings to other students of international affairs and to a broader audience

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and a minimum of 47 hours of specified courses with a grade of C- or better (none may be taken *pass/fail*), distributed as follows

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Lower-division (14–18 hours)</b>	
ECON 1000 Introduction to Economics or ECON 2010 Principles of Microeconomics and ECON 2020 Principles of Macroeconomics . . . . .	4-8
IAFS 1000 Global Issues and International Affairs . . . . .	4
PSCI 2012 Introduction to Comparative Politics . . . . .	3
PSCI 2223 Introduction to International Relations . . . . .	3

### Upper-division

Complete the requirements listed below for general upper-division functional areas and the requirements for geographic concentration, foreign language, and critical thinking seminar. There are two options.

**Option I:** Seven functional area classes plus three geographic concentration classes

**Option II:** Six functional area classes plus four geographic concentration classes

For either option, at least one class in each of the four functional areas must be completed (12 hours total). Students may specialize by applying up to four classes in a given functional area with Option I. Students cannot apply more than four functional area classes from any one department. IAFS 3000 can be repeated up to 9 credits for different topics.

### Development and Culture (Functional Area I)

ANTH 4020 Explorations in Anthropology (approved sections only); ANTH 4500 Cross-Cultural Aspects of Socioeconomic Development; ANTH 4510 Applied Cultural Anthropology; ECON 3784 Economic Development; ECON 4606 Introduction to Demography; ECON 4774 Economic Reform in Developing Countries; ECON 4784 Economic Development; GEOG 3672 Gender and the Global Economy; GEOG 3682 Geography of International Development; GEOG/ECON 4292 Migration, Urbanization, and Development; LING 3545 World Language Policies; PSCI 4012 Global Development; PSCI 4732 Critical Thinking in Development

### International Economics/Business, Political Economy (Functional Area II)

ECON 3403 International Economics and Policy; ECON 3545 Environmental Economics; ECON 4413 International Trade; ECON 4423 International Finance; ECON 4433 Economics of the Pacific Area; ECON 4545 Environmental Economics; ECON 4999 Economics in Action (approved sections only); FNCE 4060 London Summer in International Finance; INBU 4200 International Financial Management; INBU 4300 International Business and Management; MKTG 3450 International Marketing; PSCI 4193 Interna-

tional Political Economy; PSCI 4272 Capitalist Democracies in the Global Economy

### Political Geography, International Security, Foreign Policy (Functional Area III)

ANTH 4580 The Holocaust; GEOG 4712 Political Geography; HIST 4050 The World War II Era; HIST 4126 US Diplomatic History since 1940; HIST 4146 Military History; HIST 4166 The War in Vietnam and Its Legacy; PHIL 3190 War and Morality; PSCI 3123 War, Peace and Strategic Defense; PSCI 3143 Problems in International Relations; PSCI 3163 American Foreign Policy; PSCI 3191 National Security Organization and Policy Making; PSCI 3193 International Behavior

### International Institutions, Rights, and Norms (Functional Area IV)

HIST 4820 Human Rights: Historical Perspectives; PHIL 3260 Philosophy and International Order; PRLC 3810 Global Issues in Leadership; PSCI 3062 Revolution and Political Violence; PSCI 4173 International Organization; PSCI 4183 International Law; PSCI 4213 Europe in the International System; PSCI 4252 Politics of Ethnicity and Nationalism; PSCI 4783 Global Issues

### Geographic Concentration

International affairs majors should choose a geographic concentration, and a language appropriate to that geographic concentration, no later than the beginning of their junior year.

**Requirements.** International affairs majors are required to complete courses concentrating on the whole or part of a region outside the United States, including sub-Saharan Africa, Asia, Europe/Eurasia, Latin America, or the Middle East.

The geographic concentration will include three or four classes, depending on whether option I or II is chosen. It should be primarily in the social sciences, must include one course incorporating contemporary history, and can include a 3-hour course of contemporary literature (taught in the foreign language).

### Language Requirement

A third-year university-level proficiency in a foreign language appropriate to the geographic concentration is required. This requirement may be met by completion of one or two semester-long, third year, university-level grammar courses (depending on the language) with a grade of C- or better, or by certification from the appropriate department of such competence.

### Critical Thinking Seminar

IAFS 4500 Post-Cold War World or IAFS 4800 Honors Seminar in International Affairs is required.

### Recommendations

- All international affairs majors should have a good command of the English language.
- Students should choose electives with a view to their relevance to this program or usefulness as prerequisites for upper-division work.
- During the semester prior to graduation, students must complete a statement of major status obtained from their advisor.
- Students in the international affairs program are encouraged to consider the possibility of participating in one of the Study Abroad programs affiliated with the University of Colorado. Students wishing to participate in such a program should contact their advisor to work out an appropriate program.
- Internships are a useful experience for students seeking a career in international affairs. The Internship in International Affairs (IAFS 4930) provides the opportunity to earn academic credit for appropriate internships in the field. This course is generally offered during the spring and summer

sessions; enrollments are limited. Interested sophomores, juniors, or seniors should consult with the director of the Internship Program. An application for admission is required for admission to the Internship Program; see [iafs.colorado.edu](http://iafs.colorado.edu) for more details. IAFS 4930 could count for upper-division functional area or a geographic concentration credit with approval from the internship director.

- The Departmental Honors Program offers the opportunity to learn and apply research skills for a select number of IAFS majors. Entry into the IAFS Honors Program is limited to seniors with a 3.400 major GPA and a 3.300 overall GPA. The Honors Seminar in International Affairs (IAFS 4800—offered each fall semester) provides instruction in research methods and facilitates the development of a sound research project. Research continues into the spring semester under the guidance of individual faculty members and through the continuation course, Honors in International Affairs (IAFS 4810). Interested and eligible students should consult with their academic advisor and the director of the Honors Program before the end of their junior year. An application is required for admission to the Honors Program; see [iafs.colorado.edu](http://iafs.colorado.edu) for more details. IAFS 4810 could count for either an upper-division functional area or a geographic concentration class with approval from the honors director.
- Students interested in international affairs may want to consider the Global Studies Residential Academic Program offered through the residence halls. See Residential Academic Programs for information.

The specific courses that may be counted to meet the requirements in this program are determined by the committee on international affairs and the dean of the College of Arts and Sciences.

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in international affairs, students should meet the following requirements:

- Declare the major by the beginning of the second semester.
- Begin language study by the third semester.
- Complete the lower-division requirements by the end of the sophomore year.
- Begin area of geographic concentration courses in first semester of the junior year.
- Begin upper-division general international affairs requirements in the first semester of the junior year.
- Successfully complete any remaining major requirements by the end of the eighth semester.

### **International Media Certificate**

An International Media Certificate is available to students majoring in international affairs or enrolled in the School of Journalism and Mass Communication. This certificate offers international affairs majors courses in the journalism school that present the basics of journalism and the practice of news gathering and dissemination internationally. It provides journalism students with courses in the College of Arts and Sciences that offer context and perspective on contemporary global issues.

The certificate requires 24–25 credit hours (depending on the lower-division courses chosen). Fifteen of the credit hours must be upper-division courses. Students majoring in international

affairs or enrolled in the School of Journalism and Mass Communication are eligible to apply for admission to the certificate program if they have completed 30 credit hours and 6 credits of courses in their major with a GPA of 2.750 or better. For more information consult [iafs.colorado.edu](http://iafs.colorado.edu) or [www.colorado.edu/journalism](http://www.colorado.edu/journalism).

### **INVST Community Studies**

Consistent with their vision for a just and sustainable world, INVST Community Studies programs develop engaged citizens and leaders who work for the benefit of humanity and the environment. INVST Community Studies innovatively operates as a community-based organization, practicing service learning and participatory education. In order to fulfill this mission, the program offers: 1) a comprehensive two-year Community Leadership Program (CLP) focused on developing community leaders who engage in compassionate action as a lifetime commitment, 2) Community Studies electives that foster civic responsibility and leadership potential, 3) a Public Achievement Program for local high school students, and 4) a Youth Council for Public Policy that empowers young people to use the democratic process as a tool for positive social change.

The INVST CLP is the flagship program that offers a unique and transformational educational experience to all majors. Each year the INVST CLP admits up to 16 students who are committed to making a positive difference with their lives. The two-year program is designed to cultivate deep understanding about issues facing people and the planet, and to provide skills and experiences for community leaders to fulfill progressive visions for change. Specifically, students participate in theory classes, skills-training classes, and two summer service-learning experiences, one domestic and one international. In addition, students intern six hours each week with community-based organizations during their first academic year, and collectively design, implement, and evaluate community leadership projects during their second academic year. Students learn and serve together in a small group environment throughout the program. Applications for the INVST CLP are due every year in March. For more information, call **303-492-7719**.

### **Jewish Studies**

The Program in Jewish Studies explores Jewish culture, history, society, and thought from a broad, interdisciplinary perspective. The program’s faculty are cutting-edge, engaged scholars and teachers from a variety of fields in the humanities and social sciences. Jewish Studies faculty members seek to inspire students and the larger community, both on and off campus, to connect Jewish thought and text to action and people’s lives.

As Jews have spread across the world over the last two millennia, they have influenced and been influenced by the cultures in which they have resided. The study of Jewish culture, society, history, and religion is, by its nature, comparative. Within the liberal arts, the Jewish Studies curriculum is related to many different areas.

The purpose of the program is to familiarize students with the different facets of Jewish civilization and to see how these facets relate to the larger world. In completing the certificate, students will have a competence in a number of areas of Jewish Studies. The certificate provides students with an opportunity to learn more about this new and growing field of scholarship.

*Required Courses**Semester Hours*

Students must successfully complete, with a grade of C- or better, 24 hours approved for the certificate. This must include one course from each cluster (literature, history, religious studies, and social sciences) as well as one of the following introductory classes: HEBR 2350-3 Introduction to Jewish Culture or HIST 1108-3 Introduction to Jewish History.

Regularly offered Jewish Studies courses include:

ANTH 4580 The Holocaust: An Anthropological Perspective . . . . .	3
ENGL 3312 Bible as Literature . . . . .	3
ENGL 3677 Jewish-American Fiction . . . . .	3
GRMN 2301 Inside Nazi Germany . . . . .	3
GRMN 2502 Representing the Holocaust . . . . .	3
GRMN2601 Kafkaesque . . . . .	3
GRMN 3501 German-Jewish Writers: From Enlightenment to the Present. . . . .	3
GRMN 5803 Ruins of Modernity . . . . .	3
GSL 3401 The Heart of Europe: Filmmakers and Writers in the 20th Century Europe. . . . .	3
HEBR 1010 Beginning Modern Hebrew . . . . .	4
HEBR 2110 Intermediate Modern Hebrew . . . . .	4
HEBR 2350 Introduction to Jewish Culture . . . . .	3
HEBR 2551 Jewish World Literature. . . . .	3
HEBR 3010 Third Year Modern Hebrew . . . . .	3
HEBR 3202 Women, Gender, and Sexuality in Judaism . . . . .	3
HIST 1108 Introduction to Jewish History. . . . .	3
HIST 4348 Topics in Jewish History . . . . .	3
HIST 4433 Nazi Germany . . . . .	3
HIST 4544 History of Yiddish Culture. . . . .	3
HIST 4803 Topics: Modern European Jewish History . . . . .	3
PHIL 2800 Topics in Modern Jewish Thought . . . . .	3
RLST 2600 Judaism, Christianity, and Islam. . . . .	3
RLST 3100 Judaism . . . . .	3
RLST 4050/5050 Hebrew Bible . . . . .	3
WRTG 3020 After the Holocaust . . . . .	3

As the Program in Jewish Studies is growing rapidly, new courses are continually being added. Visit [www.colorado.edu/jewishstudies](http://www.colorado.edu/jewishstudies) for the most current course information.

## Lesbian, Gay, Bisexual, and Transgender Studies

The Lesbian, Gay, Bisexual, and Transgender Studies (LGBT) certificate program encourages students to think critically about the function of sexuality and gender in the world around them. It asks philosophical questions such as why the social categories “homosexual” and “heterosexual” exist, and it asks historical questions about the specificity of lesbian, gay, bisexual and transgender lives.

Open to any student in the university, this interdisciplinary program consists of two required lower-division courses and a series of relevant courses in a number of different departments. Requiring 24 credit hours, the certificate is awarded upon completion of its requirements in addition to a bachelor’s degree in another field.

By developing an understanding of diverse sexual and gender identities, and the processes individuals move through in developing these identities, certificate program students apply the meaning and function of sexuality to a broad range of historical and contemporary institutions and societies.

For more information about the Lesbian, Gay, Bisexual, and Transgender Studies certificate program, contact the program directors, Dr. Scarlet Bowen at **303-735-5755**, or Dr. Bud Coleman at **303-492-5809**.

## Linguistics

*Degrees*..... BA, MA, PhD

Linguistics is the study of all aspects of human language: how languages make it possible to transmit ideas and feelings; how and why languages are similar and different; how we develop different styles and dialects; what will be required for computers to understand and produce spoken language; and how languages are used in everyday communication as well as in formal settings. Linguists try to figure out what it is that speakers know and do by observing the structure of languages, the way children learn language, slips of the tongue, conversations, storytelling, the acoustics of sound waves, and the way people’s brains react when they hear speech or read. Linguists also reconstruct pre-historic languages, and try to deduce the principles behind their evolution into the thousands of languages of the world today.

The major in linguistics is useful for careers involving cognitive science, computer science, psychology, international business, language teaching, advertising, publishing, law, and documentation. Double majors and minors are encouraged with language, computer science, psychology, communication, sociology, anthropology, international affairs, philosophy, and education.

The core of the major is a set of courses, taught in the Department of Linguistics, on the nature of language. In addition, the major requires language courses offered by other departments (except for fluent speakers of languages other than English).

The undergraduate degree in linguistics emphasizes knowledge and awareness of:

- the fundamental architecture of language in the domains of phonetics and phonology, morphology and syntax, and semantics and pragmatics;
- the diversity of languages structures;
- the main interactions between language, culture, and society, including the role of language as a cultural institution and the social functions of language diversity; and
- the approaches to the study of language that are used by a discipline other than linguistics.

In addition, students completing the degree in linguistics are expected to acquire the ability and skills to:

- demonstrate proficiency in a second language equivalent to the third-year university level;
- infer language structures from the analysis of data from unfamiliar languages; and
- give coherent general interpretations of common language phenomena in terms of language structure and language use.

## Bachelor’s Degree Program

Majors in linguistics must complete a total of 33 hours of study in general linguistics, including 9 in a natural language (for exceptions, see below). Language study is taken in other departments.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

*Required Courses**Semester Hours*

Complete the following courses in general linguistics with grades of C- or better:

LING 2000 Introduction to Linguistics . . . . .	3
LING 3100 Language Sound Structures . . . . .	3
LING 3430 Semantics . . . . .	3
LING 4420 Morphology and Syntax . . . . .	3

**Natural Language.** Students must complete with a grade of C- (2.000) or better a minimum of 9 credit hours of study of a natural language other than English (including signed languages used by deaf communities). At least 5 credit hours offered in satisfaction of this requirement must be at the 3000 level or above. The natural language requirement may be satisfied by examination or waived for foreign students whose native language is not English; in these cases, students must still meet the college minimum major requirement of 18 credit hours of upper-division course work and 30 credit hours overall in the major. Students who wish to have their language requirement waived must obtain the consent of an undergraduate advisor before registering for the fall term of the junior year.

**Electives.** A minimum of 9 elective hours must be completed with a grade of C- (2.000) or better. Courses may be chosen from the following:

LING 1000 Language in U.S. Society . . . . .	3
LING 1010 Study of Words . . . . .	3
LING 2400 Language and Gender . . . . .	3
LING 3005 Cognitive Science . . . . .	3
LING 3220 American Indian Languages . . . . .	3
LING 3500 Language/Public Interest . . . . .	3
LING 3545 World Language Policies . . . . .	3
LING 3810 Undergraduate Seminar (may be repeated once for credit) . . . . .	1
LING 4100 Perspectives on Language . . . . .	3
LING 4220 Language and Mind . . . . .	3
LING 4560 Language Development . . . . .	3
LING 4610 English Structure for TESOL . . . . .	3
LING 4800 Language and Culture . . . . .	3

Other upper-division linguistics courses may also be chosen if available; graduate courses may be taken with permission of the department.

The department recommends that prospective majors complete LING 2000 and at least two 1000-level foreign language courses (in the same language) by the end of the sophomore year, unless the student's foreign language proficiency is already advanced.

The fall semester of the junior year should include LING 3430, a 2000-level foreign language course, and a linguistics elective or LING 4420. It must also include LING 2000 if that was not taken earlier. The spring semester of the junior year should include LING 3100, a linguistics elective, and a further 2000-level foreign language course (if needed to prepare the student for the required upper-division foreign language hours).

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here refers only to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in linguistics, students should meet the following requirements:

Declare linguistics as a major by the beginning of the second semester.

Complete two semesters of study of a natural (spoken or signed) language other than English by the end of the sophomore year (fourth semester) at the latest, continue study at the 2000 level during the junior year at the latest, and take 5 credit hours at the 3000 level during the senior year (seventh and eighth semesters) at the latest. The language requirement is waived for native speakers of a language other than English, but if it is waived, 6 additional upper-division credit hours in linguistics must be taken.

Take LING 2000 (required) and LING 1000 or LING 2400 (electives) during the freshman or sophomore years and one or both of LING 3430 or 4420 during the fall of the junior year.

Take LING 3100 and an upper-division linguistics elective in the spring of the junior year. Take the remaining courses as needed during the junior or senior year.

*NOTE: A linguistics major who has been excluded from any upper-division linguistics course due to enrollment limitations will be given first preference for a seat in that course the following year if the exclusion is made known to the department staff within two weeks after it occurs. No declared linguistics major who still needs LING 2000 for fall of the junior year and attempts to register for it during the regular registration period for continuing students (spring of the sophomore year) will be excluded from the course.*

### Minor Program

A minor is offered in linguistics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Study Abroad

Language study and some courses in the major may be completed in university or university-affiliated study abroad programs, and such study is recommended. Students interested in doing part of their major work in a study abroad program should discuss the matter with their advisor before going abroad. For information on study abroad programs, consult the Office of International Education.

### Graduation with Honors

The honors program in linguistics offers the opportunity for highly motivated undergraduates to undertake a deeper and more individualized study of linguistics than is provided by the regular BA curriculum. Linguistics majors with an overall grade point average of 3.30 or higher are eligible to participate in the program. Honors that may be earned are cum laude (with honors), magna cum laude (with high honors), and summa cum laude (with highest honors).

Students interested in pursuing departmental honors are encouraged to consult with the departmental honors advisor by the beginning of their junior year to ensure that they will be able to meet the requirements for departmental honors before graduation.

### Concurrent BA/MA Degree Program

The department has a five-year concurrent bachelor's and master's degree program, which is recommended only for the most serious and able graduate students. For further information, see the graduate advisor in the spring of the sophomore year or during the first week of the fall semester of the junior year.

### Graduate Degree Programs

Students wishing to pursue graduate work in linguistics should carefully read Requirements for Advanced Degrees in the Graduate School section of this catalog and the detailed degree requirements available from the department office. A brief summary of MA and PhD requirements follow.

**Prerequisites.** Applicants should hold a recognized baccalaureate degree. They should have considerable knowledge of a language other than their native language. This knowledge may have been gained by formal study or by use of the language in a country, community, or institution where it is the usual means of communication. The department may require formal study of a foreign language by graduate students whose proficiency in this area is less than the equivalent of the college junior level. GRE scores are required from United States residents; scores are also required from native speakers of English who wish to

be considered for fellowship aid. TOEFL scores are normally required from foreign applicants.

### Master's Degree

The master's degree calls for a minimum of three semesters of study, though four semesters is usual. Students must complete LING 5030 Linguistic Phonetics, LING 5410 Phonology, LING 5420 Morphology and Syntax, LING 5430 Semantics and Pragmatics, and LING 5570 Introduction to Diachronic Linguistics.

The remaining courses are normally taken at the 5000-level or above. Students in Plan I (thesis) must complete a total of 30 semester hours, including 4–6 thesis hours. Students in Plan II (nonthesis) must complete a total of 30 semester hours of course work. All students must pass a comprehensive written examination covering general topics in linguistics plus the thesis topic if any.

The MA in linguistics for TESOL professionals is a graduate program in linguistics. The MA will provide a cohesive, professionally oriented program addressing the increased demand for professionalization in the field of teaching English as a second language. The program requires completion of 30 credit hours: 12 in graduate linguistics course, 12 in required TESOL courses, a 3-credit practicum, and a 3-credit elective course. A comprehensive examination and teaching portfolio are required.

### Doctoral Degree

To be admitted to the PhD program, students must have completed coursework equivalent to LING 5030 Linguistic Phonetics, LING 5410 Phonology, LING 5420 Morphology and Syntax, LING 5430 Semantics and Pragmatics, LING 5570 Introduction to Diachronic Linguistics, and LING 6450 Syntactic Analysis. Students who do not have this preparation will be initially admitted to the MA program and reconsidered for admission to the PhD program when these requirements are close to completion. Students may be admitted to the PhD program before finishing the MA.

In addition to phonology, syntax, semantics, and pragmatics, the department offers specializations in sociolinguistics, conversation analysis, historical linguistics, typological comparison, Amerindian linguistics, African linguistics, linguistic anthropology, psycholinguistics, neurolinguistics, language development, cognitive linguistics, and computational modeling of language knowledge. Students should select a specialization and begin their own research as early as possible.

Thirty-six hours of course work are normally required for the PhD.

Four linguistics courses are required at the 6000 level or above: LING 6450 Syntactic Analysis, LING 7100 Field Methods 1, and any two of LING 7410 Phonological Theory, LING 7420 Syntactic Theory, LING 7430 Semantic Theory, or LING 7570 Diachronic Theory.

The remaining eight courses may include up to four courses in other departments appropriate to the specialization.

All PhD students must demonstrate the ability to read linguistic literature in a language other than English.

As a PhD preliminary examination, students submit a data-based research paper at the beginning of the second year in the PhD program. The University comprehensive examination requirement is completed in two steps: the completion of a synthesis paper followed by the defense of a dissertation prospectus.

## Mathematics

*Degrees*..... BA, MA, MS, PhD

The undergraduate degree in mathematics emphasizes knowledge and awareness of:

- basic real analysis of one variable;
- calculus of several variables and vector analysis;
- basic linear algebra and theory of vector spaces;
- the structure of mathematical proofs and definitions; and
- at least one additional specialized area of mathematics.

In addition, students completing a degree in mathematics are expected to acquire the ability and skills to:

- use techniques of differentiation and integration of one and several variables;
- solve problems using differentiation and integration;
- solve systems of linear equations;
- give direct proofs, proofs by contradiction, and proofs by induction;
- formulate definitions;
- read mathematics without supervision; and
- utilize mathematics.

### Bachelor's Degree Program

The Department of Mathematics offers three tracks leading to a BA in mathematics. To earn a BA in mathematics, a student must complete the general requirements of the College of Arts and Sciences as well as the five mathematics core courses and the six additional courses for one of the three tracks (described below). Students must earn a grade of C- or better in each of the mathematics core courses and the six additional courses, and have at least a C average for all attempted work in mathematics.

#### Required Courses

#### Semester Hours

#### Mathematics Core (required of all mathematics majors)

Calculus 1 (e.g., MATH 1300 or APPM 1350)	3
Calculus 2 (e.g., MATH 2300 or APPM 1360)	3
MATH 2001 An Introduction to Discrete Mathematics	3
MATH 3001 Analysis I	3
MATH 3130 Linear Algebra	3

#### Comprehensive Track

Aimed at students seeking a general background in mathematics or intending to pursue graduate work in mathematics.

#### Additional Courses Required

Calculus III (e.g., MATH 2400 or APPM 2350)	4
MATH 3140 Abstract Algebra I	3
One of MATH 4140 Abstract Algebra II or MATH 4001 Analysis II	3
Plus 3 upper-division MATH or approved APPM courses (at least one at the 4000-level)	9

(For a complete list of approved courses see [spot.colorado.edu/~carriem/math\\_advising](http://spot.colorado.edu/~carriem/math_advising))

#### Applicable Track

Aimed at students seeking a background in applied or applicable mathematics.

#### Additional Courses Required

Calculus III (e.g., MATH 2400 or APPM 2350)	4
MATH 4510 Introduction to Probability	3
MATH 4430 Introduction to Ordinary Differential Equations	3
One of MATH 4520 Mathematical Statistics or MATH 4470 Partial Differential Equations 1	3



Plus 2 upper-division MATH or approved APPM courses . . . . . 6  
(For a complete list of approved courses see [spot.colorado.edu/~carriem/math\\_advising](http://spot.colorado.edu/~carriem/math_advising))

### Secondary Education Track

Aimed at students intending to teach mathematics at the secondary level.

#### Additional Courses Required

MATH 3120 Functions and Modeling . . . . .	3
MATH 3510 Introduction to Probability and Statistics . . . . .	3
MATH 3140 Abstract Algebra I . . . . .	3
MATH 3110 Introduction to the Theory of Numbers . . . . .	3
MATH 3210 Euclidean and Non-Euclidean Geometry I . . . . .	3
MATH 4210 Euclidean and Non-Euclidean Geometry II . . . . .	3

*NOTE: Completion of the Secondary Education Track does not provide the student a teaching license. For information about the secondary education teaching licensure program, see the School of Education section.*

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress,” as it is used here, refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major.

### Comprehensive Track

Declare major by the beginning of the second semester.  
Complete Calculus 1, Calculus 2, Calculus 3, MATH 2001, 3001, and 3130 by the end of the fourth semester.  
Complete MATH 3140, 4140, or 4001, and one additional approved MATH or APPM course by the end of the sixth semester.  
Complete the major by the end of the eighth semester.

### Applicable Track

Declare major by the beginning of the second semester.  
Complete Calculus 1, Calculus 2, Calculus 3, MATH 2001, 3001, and 3130 by the end of the fourth semester.  
Complete MATH 4510 and 4430, and either MATH 4520 or 4470 by the end of the sixth semester.  
Complete the major by the end of the eighth semester.

### Secondary Education Track

Declare major by the beginning of the second semester.  
Complete Calculus 1, Calculus 2, MATH 2001, 3001, 3120, and 3130 by the end of the fourth semester.  
Complete MATH 3510 and 3210, and either MATH 3110 or 3140 by the end of the sixth semester.  
Complete the major by taking MATH 4210 and the remaining of MATH 3110 or 3140 the end of the eighth semester.

### Residency Requirement

For the BA degree in mathematics, all students must have completed at least 12 credit hours of upper-division mathematics courses, with grades of C (2.00) or better, taken in the College of Arts and Sciences on the Boulder campus. Additional courses transferred from other universities or from other campuses of the University of Colorado that are used to meet the minimum 24-hour upper-division requirement must be approved by the Department of Mathematics. Courses accepted as mathematics credit but excluded from the minimum 24-hour upper-division requirement still count in the 45 maximum hours allowed in mathematics.

Undergraduate students planning to do graduate work in mathematics should follow the Comprehensive Track, as well as fulfill the arts and sciences language requirement with German, French, or Russian.

### Minor Program

A minor is offered in mathematics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For minor information see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

### Mathematics Modules Program

The Department of Mathematics is no longer offering the flexibly-paced courses formerly known as the Mathematics Modules.

The content of those courses is now covered in lecture-based formatted courses. Students may contact the Department of Mathematics for further information.

### Graduate Degree Programs

The Department of Mathematics offers programs leading to the degrees MA or PhD in mathematics and MS in applied mathematics. Students interested in any of these programs should read carefully the materials describing the university requirements in the Graduate School section. The student is responsible for satisfying these requirements at the proper time.

Applicants must have demonstrated mathematical maturity and accomplishment roughly at the level of a successful mathematics major at CU-Boulder. Applicants must also demonstrate mathematical potential: success in courses in advanced calculus and abstract algebra help demonstrate this potential. General and Mathematics GRE subject scores are required.

The basic requirements for the various degrees are summarized here, and full details are available in the department office or online at [www.colorado.edu/math](http://www.colorado.edu/math). For fulfillment of all course requirements, mathematics courses must be numbered 5000 or higher excluding MATH 5800.

All master's degree students must complete 30 hours of approved graduate credit. No more than 6 credit hours of seminars or independent study may be included for this requirement.

All master's degree students must take two 2-semester sequences. No language is required of master's degree students.

To earn an MA or MS degree, a student must pass a master's examination based on the particular program of the student.

For the MA degree in mathematics, students can pursue a “thesis option,” which requires 4–6 credit hours of thesis work, and a thesis defense.

For the MS degree in applied mathematics, 6–12 credit hours must be in an approved minor program outside the mathematics department.

Before being admitted to candidacy for the PhD degree in mathematics, a student must pass examinations in real analysis and modern algebra, take courses in topology and complex analysis, and pass a comprehensive exam. The basic requirements for a PhD degree in mathematics are as follows:

Demonstrate reading knowledge of French, German, Italian, or Russian.

Complete at least 30 credit hours of graduate course work and 30 credit hours of thesis work

Prepare a written thesis that contains substantial original contributions to mathematics

Successfully complete a final examination.

For more current and precise details, contact the mathematics office or go to the department website at [www.colorado.edu/math](http://www.colorado.edu/math).

### Medieval and Early Modern Studies

To the Middle Ages, the modern world owes the preservation and transmission of Latin and Greek; the development of a host of vernaculars; the evolution of Judaism and Christianity, and the rise of Islam; the renewed study of Roman law; the growth

of a mercantile class; the creation of musical notation; the erection of ecclesiastical monuments; the foundations of constitutional government; and the institution of universities. The early modern period inherited and elaborated all these institutions and inventions, adapting them to fit new conceptions of man (and woman), church, and state.

The Center for Medieval and Early Modern Studies is founded on the convictions that the period from c. 400 to c. 1800, conceived in a global context, is a dynamic cultural continuum and ever-evolving system; that study of both periods in tandem sheds new light on each; and that the unity and diversity of the premodern world can be understood and appreciated only from an interdisciplinary perspective. Medieval and Early Modern Studies therefore crosses boundaries of period, nation, language, and discipline, and the center's prime function is to facilitate and encourage interdepartmental study and teaching.

Courses throughout the curriculum are available to students whose area of specialization within a given department is the medieval and/or early modern period(s) and who wish to broaden their knowledge of the cultures of the period. With the approval of the major department, a coherent group of these courses may be accepted as a related program of study and as part of the requirements for an undergraduate degree. For additional details concerning these courses, see departmental listings.

For more information, and to inquire about the undergraduate certificate program, consult Professor Paul Hammer, interim director, Center for Medieval and Early Modern Studies, Department of History, University of Colorado at Boulder, 234 UCB, Boulder, CO 80309-0234.

## Molecular, Cellular, and Developmental Biology

Degrees ..... BA, MA, PhD

The undergraduate degree in molecular, cellular, and developmental biology emphasizes knowledge and awareness of:

- the biological sciences in general and detailed understanding of currently important aspects of cellular biology, molecular biology, biochemistry, genetics, and developmental biology; and
- the relationship of the specialty area to broader areas of science and to society in general, including ethical issues raised by current biological research and by the rapid growth of biotechnology as an important shaping force for the future.

In addition, students completing the degree in molecular, cellular, and developmental biology are expected to acquire the ability and skills to:

- learn detailed laboratory procedures rapidly when the need arises;
- demonstrate a scientific vocabulary and an understanding of research methods that permits the comprehension of articles from current journals, extraction of pertinent information, and judgment of the quality of the work described;
- evaluate a biological problem, determine which aspects are understood, and apply basic research methods and techniques to the unknown aspects; and
- communicate scientific concepts and analytical arguments clearly and concisely, both orally and in writing.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
MCDB 1150 Introduction to Molecular Biology and 1151 Introduction to Molecular Biology Laboratory or MCDB 1111 Biofundamentals: The Evolutionary, Molecular, and Cellular Basis of Life (Note 1) . . . . .	4
MCDB 2150 Principles of Genetics and MCDB 2151 Principles of Genetics Laboratory . . . . .	4
MCDB 3120 Cell Biology and MCDB 3140 Cell Biology Laboratory. . . . .	5
MCDB 3500 Molecular Biology . . . . .	3
MCDB 4650 Developmental Biology or MCDB 4300 Immunology . . . . .	3
Upper-division electives in MCDB. Must include at least two MCDB courses and at least two lecture courses. A maximum of 6 credit hours of non-MCDB courses may be counted toward the 30 credits required for the MCDB major. For a list of acceptable courses, check with the department academic advisors . . . . .	11-12
CHEM 1113/1114; CHEM 1133/1134; CHEM 1251/1271, General Chemistry 1 and 2 lecture and lab, or CHEM 1351 and 1371 Honors General Chemistry 1 and 2 . . . . .	10
CHEM 3311 Organic Chemistry 1 and CHEM 3321 Laboratory in Organic Chemistry 1 or CHEM 3351 Organic Chemistry 1 and CHEM 3361 Laboratory in Organic Chemistry 1 for Chemistry Majors. . . . .	5-6
CHEM 4611 Survey of Biochemistry or CHEM 4711 General Biochemistry 1 . . . . .	3
PHYS 1110 and 1120 General Physics 1 and 2 and PHYS 1140 Experimental Physics or PHYS 2010 and 2020 General Physics 1 and 2, or PHYS 1110 and PHYS 2020 . . . . .	9-10
MATH 1300 Analytic Geometry and Calculus 1 (Note 2). . . . .	5

It is strongly recommended that MCDB majors consult with a departmental advisor before applying AP, IB, or CLEP credit. Students majoring in MCDB who transfer biology credit from other institutions also must consult a departmental advisor.

### *Curriculum Notes*

1. EBIO 1210 and 1230 are acceptable alternatives.
2. APPM 1350 or MATH 1310 are acceptable alternatives.

### *MCDB Prerequisites Statement*

It is MCDB policy to enforce the course prerequisites listed on the Student Information System (SIS). If you have not either taken *and passed* (C- or better) the prerequisites for a course, or obtained permission from the instructor or a departmental advisor to take the course based on equivalent preparatory course work or experience here or elsewhere, *you may be administratively dropped from the course* in favor of a student on the wait list who has passed the prerequisites.

### *Graduating in Four Years*

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in molecular, cellular, and developmental biology, students should meet the following requirements:

- The MCDB major must be started in the first semester for a student to be eligible for guaranteed four-year graduation. Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. Adequate progress is defined as cumulative completion of at least one-fourth of the required course work for the major during each academic year, including the following specific requirements: Either general chemistry or the introductory MCDB sequence must be completed during the first year. General chemistry and the introductory MCDB sequence must both be completed by the end of the second year. Organic chemistry and the second-level sequence in MCDB (cell biology and molecular biology) must be completed by the end of the third year.

### Animal Use Policy

Biology is the science of life, and a major in it must include some hands-on experience with living organisms to be complete. Exercises involving the use of living animals or animal tissues are included, therefore, in MCDB laboratory courses. Majors with objections on moral grounds may arrange to limit their participation in these exercises, although their educational experience is compromised by doing so.

Nonmajors may take MCD biology lecture courses without the accompanying laboratories. Laboratory courses in which living vertebrate animals or tissues are used are identified in the course description section of this catalog. For additional information, please contact the department.

### Graduate Degree Programs

Opportunities for graduate study and original research, leading to the PhD degree, are available in a variety of areas.

**Molecular Biology.** Includes gene regulation, virology, nucleic acid-protein interactions, chromosome structure and function, chromosome replication, microbial diversity, human genome structure, RNA structure, and catalysis.

**Cell Biology.** Includes cytoskeleton, biophysical cytology, vacuole assembly, analysis of yeast spindle pole bodies and vertebrate centrosomes, synthesis and secretion of glycoproteins and polysaccharides, defense responses in plants, and 3-D high resolution reconstruction, biogenesis of mitochondria and chloroplasts, energy metabolism, assembly of membrane protein complexes, cell cycle regulation and checkpoints, and signal transduction.

**Developmental Biology.** Covers mechanisms and regulation of morphogenesis and cell growth, genetic control of development, molecular genetics of embryogenesis, sex determination, ras proteins and vulval development, and programmed cell death in nematodes, molecular genetics of *Drosophila* neurobiology, developmental genetics of *Drosophila* and *Caenorhabditis*, neural development in mice, transgenic mice, and muscle development and function.

**Genetics.** Includes genetics of human disease, complex traits, mouse development, and invertebrate development.

**Entrance Requirements and Prerequisites.** The graduate program of the Department of Molecular, Cellular, and Developmental Biology is sufficiently flexible to accommodate students with a wide range of training. Students with bachelor's degrees in any of the biological, biochemical, or physical sciences are encouraged to apply. Background necessary for the program includes the equivalent of undergraduate courses in cell biology, developmental biology, genetics, organic chemistry, biochemistry, chemical thermodynamics, differential and integral calculus, and general physics. Students accepted with deficiencies may demonstrate mastery of the required areas by taking appropriate undergraduate courses, by passing advanced-standing examinations, or by successfully completing graduate-level courses that require the undergraduate courses as prerequisites. Students admitted generally have independent research experience.

**Areas of Study.** All students are expected to develop competence in five areas: biochemistry, genetics, cell structure and function, developmental systems and mechanisms, and current research techniques of experimental biology. Students also are expected to develop their abilities as independent investigators who identify important questions in biology and design experiments to address those questions.

### Doctoral Program

**Course of Study.** The faculty of the department offers a variety of courses to help graduate students acquire knowledge in the various areas of study. Further, students are required to work in at least three different laboratories to broaden their education and to help them identify the field of greatest interest for their thesis work.

**Examination Sequence.** An advisory committee, appointed upon entrance, develops an appropriate curriculum based in part on the student's background. A written preliminary exam consists of a series of courses and exams administered during the first year. A comprehensive qualifying exam administered at the end of the second year includes a written research proposal and an oral defense of the proposal that emphasizes breadth and depth of knowledge as well as an ability to communicate and synthesize facts into a coherent scientific argument.

**Language.** The department does not have a language requirement.

**Thesis.** The principal elements in graduate training are defining a thesis problem, investigating this problem with a coherent piece of research that constitutes a substantial contribution to knowledge, and writing a report on this work in the form of peer-reviewed journal articles and a thesis submitted to a departmental committee for approval. After completion of the thesis, each candidate for the PhD degree is required to take a final oral examination on the thesis and related topics, and to present a public seminar.

**Teaching.** Generally, each candidate for the PhD degree does two semesters of apprentice teaching. This obligation is usually met during the student's first year of graduate study.

**Course Requirements.** A minimum of 30 credit hours of courses numbered 5000 and above, plus 30 hours of doctoral thesis, are required. Specific courses depend on the student background and field of specialization.

**Master's Program.** In view of the strong research orientation of the fields involved, the department does not accept applications from students seeking the MA as a terminal degree. The master's of arts degree, either with a thesis (Plan I) or without (Plan II), is awarded under special circumstances. Candidates must pass the preliminary examination and a comprehensive final examination. For Plan I a thesis based on original research must be submitted. Final determination of whether a student follows Plan I or Plan II is made by the department.

### Museum and Field Studies

*Degree* ..... MS

Museum courses listed in this catalog may be taken with the approval of the student's major department and the course instructor, although no undergraduate major is offered in museum studies. A graduate professional certificate in Museum and Field Studies is offered to graduate students in other disciplines.

Graduate training in anthropology, art history, history, botany, entomology, paleontology, and zoology is provided under the direction of museum faculty in cooperation with cognate departments and the museum and field studies program. Areas of study include, but are not limited to:

- anthropological interpretation
- diatom taxonomy, systematics, and ecology
- southwestern archaeology and ethnology
- plant taxonomy, evolution, and phytogeography
- vertebrate paleontology and Cenozoic stratigraphy

biology of aquatic invertebrates  
 systematics and population biology of insects of the Rocky Mountain Region  
 plant–insect interactions

Museum assistantships include support from the Walker Van Riper fund and research support from the Collie and William Henry Burt museum funds. Other financial assistance is available to selected students. Students interested in working toward advanced degrees under the direction of museum faculty should write the University of Colorado Museum, Museum and Field Studies, University of Colorado at Boulder, 265 UCB, Boulder, CO 80309-0265, e-mail [mfsinfo@colorado.edu](mailto:mfsinfo@colorado.edu), or visit [cumuseum.colorado.edu/MFS](http://cumuseum.colorado.edu/MFS).

**Graduate Degree Program**

The University Museum offers a program leading to the degree of Master of Science, Museum and Field Studies. Please see Interdisciplinary Programs in the Graduate School section.

Applicants accepted for graduate work by museum faculty must be admitted to the Graduate School.

**Neuroscience**

The neurosciences certificate program encourages undergraduate students interested in how the brain controls behavior to take courses in the basic sciences while providing the means to specialize in neuroscience. Since this subdiscipline of the biological sciences spans a number of departments at the university (e.g., integrative physiology, psychology, and MCD biology), students are encouraged to obtain greater academic breadth through interdepartmental course selection.

To obtain the certificate, a student must satisfy the requirements of a major and the certificate program, and maintain a grade point average of 3.200 or better.

For more information, see [www.colorado.edu/neuroscience](http://www.colorado.edu/neuroscience) program.

**Nordic Studies (Scandinavian)**

*See Germanic and Slavic Languages and Literatures.*

**Peace and Conflict Studies**

The Certificate Program in Peace and Conflict Studies (PACS) is designed to help students explore why conflict and violence occur and learn how conflict can be managed and transformed to accomplish constructive ends. The certificate is granted by the dean of the College of Arts and Sciences, but students in any school or major at the University of Colorado may earn it.

The program takes an interdisciplinary perspective to the study of conflict, cooperation, war, and peace. Course work from various departments focuses on personal and social change, intra- and international conflicts, processes of conflict resolution, creative nonviolent activism, and the analysis of violence of various forms. The program encourages hands-on, “in the field” learning of peace and conflict issues through volunteer and internship placements with a wide variety of peace, justice, and development agencies.

Completion of the certification requires 24 credit hours of study including:

- PACS 2500 Introduction to Peace and Conflict Studies
- PACS 4500 Senior Seminar in Peace and Conflict Studies
- 9 credit hours of relevant course work in the student’s major
- 9 credit hours of relevant course work outside the major.

For information or application go to the program’s website: [3cg.colorado.edu/drupal\\_pacs](http://3cg.colorado.edu/drupal_pacs).

**Philosophy**

*Degrees*..... BA, MA, PhD

The undergraduate degree in philosophy emphasizes knowledge and awareness of:

- some of the principal philosophical texts in the history of western philosophy, from its beginnings in Greece to the late 19th century;
- some of the main currents in 20th century philosophy, including some acquaintance with contemporary philosophical issues and modes of inquiry;
- a single major author or a single philosophical movement; and
- elementary formal logic.

In addition, students completing the degree in philosophy are expected to acquire the ability and skills to:

- form reasoned opinions about the issues—moral, religious, political, etc.—that educated people debate;
- understand, analyze, and evaluate complex arguments and theories;
- distinguish between the main thrust of an argument or position and what is ancillary to it;
- discover and critically examine the underlying presuppositions of major systems of ideas or programs for action;
- see important connections between different systems of ideas or programs for action;
- explain difficult ideas and concepts in an informed, effective, and coherent manner;
- develop a thesis and present a coherent argument for it;
- write a clear and coherent essay; and
- engage in rational and productive discussion of issues and arguments.

**Bachelor’s Degree Program**

For the undergraduate degree in philosophy, students must take 33 to 45 credit hours in philosophy, earning 33 hours with a grade of C- or better in each course in philosophy and 2.00 (C) average for all work attempted in philosophy. Also, students must take 18 hours of upper-division work in philosophy with a grade of C- or better, with at least 12 of those 18 credit hours completed on the CU-Boulder campus. No more than 8 credit hours of independent study may count toward the minimum requirement.

Students are advised to consult the online Schedule Planner for the most accurate information on prerequisites, since these sometimes vary with instructors.

Courses may be taken in any order providing prerequisites, if any, are met. However, the department strongly recommends completion of PHIL 2440, 3000, 3010, and 3480 in the first year of the major program.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>History</b> (three courses) . . . . .	9
PHIL 3000 History of Ancient Philosophy, Ancient and Medieval	
PHIL 3010 History of Modern Philosophy, Modern	

One course of the following:

- PHIL 4010 Single Philosopher
- PHIL 4020 Topics in the History of Philosophy
- PHIL 4030 Medieval Philosophy
- PHIL 4040 20th Century Philosophy
- PHIL 4070 Existentialist Philosophy
- PHIL 4080 Introduction to Phenomenology
- PHIL 4250 Marxism

**Logic** (one of the following courses) . . . . . 3  
 PHIL 2440 Symbolic Logic  
 PHIL 4440 Topics in Logic

**Philosophical Writing** (one course) . . . . . 3  
 PHIL 3480 Critical Thinking and Writing in Philosophy (prereq. or coreq.,  
 PHIL 2440 Symbolic Logic)

**Values** (two courses)  
 The following required course: PHIL 3100 Ethical Theory (prereq. or  
 coreq., PHIL 3480 Critical Thinking and Writing in Philosophy) . . . . . 3

One of the following additional courses . . . . . 3  
 PHIL 2140 Environmental Justice  
 PHIL 2200 Major Social Theories  
 PHIL 2220 Philosophy and Law  
 PHIL 2290 Philosophy and Women  
 PHIL 3110 Feminist Practical Ethics  
 PHIL 3140 Environmental Ethics  
 PHIL 3160 Bioethics  
 PHIL 3190 War and Morality  
 PHIL 3200 Social and Political Philosophy  
 PHIL 3260 Philosophy and the International Order  
 PHIL 4110 Contemporary Moral Theory  
 PHIL 4200 Contemporary Political Philosophy  
 PHIL 4250 Marxism

**Metaphysics and Epistemology** (two courses)  
 The following required course: PHIL 3340 Epistemology (prereq. or  
 coreq. PHIL 3480 Critical Thinking) . . . . . 3

One of the following additional courses . . . . . 3  
 PHIL 3600 Philosophy of Religion  
 PHIL 4300 Philosophy of Mind  
 PHIL 4360 Metaphysics  
 PHIL 4400 Philosophy of Science  
 PHIL 4490 Philosophy of Language

**Electives** (two courses) (includes all courses that are at the 2000 level or  
 above, and are not taken to satisfy any of the above requirements) . . . . 6

*NOTE: The department offers topically oriented majors that are interdisciplinary in nature, including law and society, and values and social policy. These majors require two semesters in the history of philosophy, as well as a series of core courses that vary according to the topic. A student intending to complete a topical major in philosophy should see the departmental undergraduate advisor as soon as possible.*

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in philosophy, students should meet the following requirements:

- Declare major by the beginning of the second semester.
- Complete an average of 6.7 credit hours of required philosophy courses in each of the next five semesters.
- Meet with the undergraduate advisor at the time the major is declared.
- Complete PHIL 2440, PHIL 3480, PHIL 3000, and PHIL 3010 by the end of the fifth semester of study.

**Minor Program**

A minor is offered in philosophy. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

**Graduate Degree Programs**

Applicants for admission to the Graduate School for work toward a master’s or doctoral degree with a major in philosophy are expected to have had 18 or more credit hours in undergraduate courses in the subject.

Through its MA and PhD programs, the department offers three areas of concentration in graduate study: history of philosophy, contemporary metaphysics, and moral theory and practical ethics.

Beyond the required course work and examinations for the PhD, a diversified faculty provides opportunity for a wide range of specialization in the dissertation project. The department makes available a limited number of teaching assistantships and assists with job placement. Descriptions of all degree programs are available from the Department of Philosophy.

Students wishing to pursue graduate work in philosophy should note requirements for advanced degrees in the Graduate School chapter and should obtain a copy of the *Graduate Program Rules* from the department.

Descriptions of all degree programs are available from the Department of Philosophy.

**Physics**

*Degrees*..... BA, MS, PhD

The undergraduate degree in physics emphasizes knowledge and awareness of:

- the basic subfields of physics (classical mechanics, electricity and magnetism, quantum mechanics, statistical mechanics, and thermodynamics), as well as at least one specialty area of application (e.g., solid state physics or optics);
- the major principles of physics, their historical development, and the roles they play in the various subfields of physics;
- the interrelations between theory and observation, the role of systematic and random experimental errors, and methods used to analyze experimental uncertainty and compare experiment with theory;
- physical phenomena and experience in the use of basic experimental apparatus and measuring instruments;
- mathematics sufficient to facilitate the acquisition and application of physical principles; and
- the importance of physics in other fields such as chemistry, biology, engineering, medicine, and in society at large.

In addition, students completing the degree in physics are expected to acquire the ability and skills to:

- apply physical principles to new situations;
- construct and assemble experimental apparatus, conduct and analyze measurements of physical phenomena, analyze properly experimental uncertainty, and make meaningful comparisons between experiment and theory; and
- communicate results of scientific inquiries verbally and in writing.

**Bachelor’s Degree Programs**

Three different plans are available to students in physics. Because there is some flexibility within each plan, the department encourages students to pursue their own interests in setting up their curriculum. The final responsibility for fulfilling the requirements for the degree rests with the student.

Students who have declared physics as a major are required to consult with the departmental advisor at least once per semester. Even if first-year students are only considering physics as a major, they are strongly encouraged to visit the departmental advisor and discuss the situation. Because most of the advanced physics courses have various prerequisites, failure to settle on an appropriate plan of study early in the college career can result in delay and complications later.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

### Plan I

Primarily for those planning graduate work in physics, this plan includes 45 credit hours of physics courses.

<i>Required Courses</i>	<i>Semester Hours</i>
PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
PHYS 2150 Experimental Physics . . . . .	1
PHYS 2170 Foundations of Modern Physics . . . . .	3
PHYS 2210 Classical Mechanics and Math Methods 1 . . . . .	3
PHYS 3210 Classical Mechanics and Math Methods 2 . . . . .	3
PHYS 3220 Quantum Mechanics and Atomic Physics 1 . . . . .	3
PHYS 3310 Principles of Electricity and Magnetism 1 . . . . .	3
PHYS 3320 Principles of Electricity and Magnetism 2 . . . . .	3
PHYS 3330 Junior Laboratory. . . . .	2
PHYS 4230 Thermodynamics and Statistical Mechanics . . . . .	3
PHYS 4410 Quantum Mechanics and Atomic Physics 2 . . . . .	3
Electives in physics (chosen from the departmental list) . . . . .	minimum 9

Three of the 9 hours must be one of the courses PHYS 3340, PHYS 4430, or PHYS 5430 or a research activity of 3 credit hours. The research activity may be completed in one of the following ways: (1) under either PHYS 4610/4620/4603 Honors or PHYS 4840/4850 Independent Study; or (2) by documentation of your accomplishments as an intern with a research activity within the physics department or a suitable cognate department, institute, or external entity such as NCAR, NIST, NOAA, etc. Approval by a physics department advisor is required for option (2) and should be obtained in advance. Up to 3 credit hours earned under choice (1) may be counted toward the electives requirement. No academic credit is earned under the internship option (2), so if an internship is taken, students must still earn credit through one of the required courses.

In addition, the following nonphysics courses are required:

MATH 1300 Analytic Geometry and Calculus 1 or APPM 1350 Calculus 1 for Engineers . . . . .	4-5
MATH 2300 Analytic Geometry and Calculus 2 or APPM 1360 Calculus 2 for Engineers . . . . .	4-5
MATH 2400 Analytic Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers . . . . .	4
APPM 2360 Introduction to Differential Equations with Linear Algebra, or both MATH 3130 Introduction to Linear Algebra and MATH 4430 Ordinary Differential Equations . . . . .	4-6
CHEM 1113/1114 and 1133/1134 General Chemistry 1 and 2 or CHEM 1151 and 1171 Honors General Chemistry 1 and 2 . . . . .	10

### Plan II

For students desiring either an interdisciplinary or an applied physics program. The interdisciplinary program includes astrophysics, atmospheric physics, geophysics, or a combination of a physics major with work in another area such as applied mathematics, biophysics, chemical physics, environmental sciences, philosophy and history of science, or pre-medicine. The applied physics program includes biotechnology, optics, fluid dynamics, or electronic devices. For the interdisciplinary program, 33 hours of physics courses, plus 3 hours of physics electives, plus 12 hours of interdisciplinary courses are required. For the ap-

plied physics program, 33 hours of physics courses plus 15 hours of applied physics courses are required.

<i>Required Courses</i>	<i>Semester Hours</i>
PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
PHYS 2150 Experimental Physics . . . . .	1
PHYS 2170 Foundations of Modern Physics . . . . .	3
PHYS 2210 Classical Mechanics and Math Methods 1 . . . . .	3
PHYS 3210 Classical Mechanics and Math Methods 2 . . . . .	3
PHYS 3220 Quantum Mechanics and Atomic Physics 1 . . . . .	3
PHYS 3310 Principles of Electricity and Magnetism 1 . . . . .	3
PHYS 3320 Principles of Electricity and Magnetism 2 . . . . .	3
PHYS 3330 Junior Laboratory. . . . .	2
PHYS 4230 Thermodynamics and Statistical Mechanics . . . . .	3
Electives in physics (chosen from the departmental list) . . . . .	minimum 3

In addition, the following nonphysics courses are required:

MATH 1300 Analytic Geometry and Calculus 1 or APPM 1350 Calculus 1 for Engineers . . . . .	4-5
MATH 2300 Analytic Geometry and Calculus 2 or APPM 1360 Calculus 2 for Engineers . . . . .	4-5
MATH 2400 Analytic Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers . . . . .	4
APPM 2360 Introduction to Differential Equations with Linear Algebra, or both MATH 3130 Introduction to Linear Algebra and MATH 4430 Ordinary Differential Equations . . . . .	4-6
CHEM 1113/1114 and 1133/1134 General Chemistry 1 and 2 or CHEM 1151 and 1171 Honors General Chemistry 1 and 2 . . . . .	10

Courses in the interdisciplinary or applied physics subjects may not be double counted with the required 33 hours of physics courses. Interdisciplinary or applied physics courses must be approved by the physics department, either by the preapproved existing list of courses in each discipline or by a physics department mentor on a course-by-course basis. It is therefore imperative that students in Plan II be in close contact with the physics department advisor.

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in physics plans I and II, students should meet the following requirements:

- Declare a major in physics in the first semester of the freshman year.
- Complete PHYS 1110, 1120, 1140, MATH 1300 or APPM 1350, and MATH 2300 or APPM 1360 during the freshman year.
- Complete PHYS 2150, 2170, and 2210, CHEM 1111 or 1151, CHEM 1131 or 1171, MATH 2400 or APPM 2350, and APPM 2360 during the sophomore year. Either MATH 3130 or 4430 can substitute for APPM 2360.
- Complete PHYS 3210, 3220, 3310, 3320 and 3330 during the junior year.
- Students must meet with the physics advisor before the beginning of the junior year and get the fifth-semester approval for completion plan (FSACP). In addition to completing PHYS 4230 and 4410, plan I students must get approval to complete 9 credit hours in physics electives, with a research participation component. In addition to completing PHYS 4230, interdisciplinary Plan II students must complete 3 credit hours of physics electives and 12 credit hours of interdisciplinary courses. Applied physics students must complete 15 credit hours of applied physics courses.

*NOTE: Early in the first semester of the senior year, the student must meet with the physics advisor to have the statement of major status (a part of the graduation package provided by the College of Arts and Sciences) filled in. This includes a plan for completing the requirements of the major during the senior year and must be signed by the student and the advisor. Further details concerning the execution of the guarantee can be obtained from the department.*

**Plan III**

For students intending to become elementary/secondary school teachers, this plan involves a minimum of 28–31 credit hours of physics and a minimum of 35 hours in education courses. An education student advisor, who should be consulted for updated requirements, is available by appointment at 303-492-2559.

*Required Courses* *Semester Hours*

PHYS 1110 and 1120 General Physics 1 and 2 . . . . .	8
PHYS 1140 Experimental Physics 1 . . . . .	1
PHYS 1150 Experimental Physics 2 . . . . .	1
PHYS 2130 General Physics 3 . . . . .	3
PHYS 2150 Experimental Physics . . . . .	1
PHYS 2210 Classical Mechanics and Math Methods 1 . . . . .	3
PHYS 3210 Classical Mechanics and Math Methods 2 . . . . .	3
PHYS 3310 Principles of Electricity and Magnetism 1 . . . . .	3
PHYS 3330 Junior Laboratory . . . . .	2
PHYS 4450 History and Philosophy of Physics . . . . .	3
ASTR 1030 Accelerated Introduction to Astronomy 1 . . . . .	4

An additional required course for teaching in secondary schools:

PHYS 3220 Quantum Mechanics and Atomic Physics 1 . . . . .	3
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In addition, the following nonphysics courses are required:

CHEM 1011, 1031 Environmental Chemistry 1 and 2, or CHEM 1113/1114 and 1133/1134 General Chemistry 1 and 2, or CHEM 1151 and 1171 Honors General Chemistry 1 and 2 . . . . .	7-10
MATH 1300 Analytic Geometry and Calculus 1 or APPM 1350 Calculus 1 for Engineers . . . . .	4-5
MATH 2300 Analytic Geometry and Calculus 2 or APPM 1360 Calculus 2 for Engineers . . . . .	4-5
MATH 2400 Analytic Geometry and Calculus 3 or APPM 2350 Calculus 3 for Engineers . . . . .	4
APPM 2360 Introduction to Differential Equations with Linear Algebra or both MATH 3130 Introduction to Linear Algebra and MATH 4430 Ordinary Differential Equations . . . . .	4-6

*Special Requirements* *Semester Hours***PLACE Basic Skills Assessment**

Prior to or during the semester for which students are seeking admission to the Teacher Education Program, they must take the PLACE Basic Skills Assessment. A copy of the PLACE Registration Bulletin form is available in the Office of Teacher Education in Education 151. Students should read it carefully for specific information on the assessments and registration procedures. Students must successfully complete the Liberal Arts, Professional Knowledge, and Contents Fields portions of this examination.

**Liberal Arts**

Humanities (i.e., from "Literature and the Arts" in the College of Arts and Sciences core curriculum) . . . . .	6
Social sciences (i.e., from "Content Area Studies" in the College of Arts and Sciences core curriculum, except "Literature and the Arts" and "Natural Sciences"). . . . .	6

**Science**

MATH 1300 Analytic Geometry and Calculus 1 . . . . .	5
Two courses (minimum of 3 semester hours) in each of biology, chemistry, earth science, and physics. The eight courses must include a course with attached laboratory work in three of the four subjects)	
EDUC 5312 The Nature of Science and Science Education . . . . .	3
Science course work taken in the past five years . . . . .	6

**Education**

EDUC 3013 Proseminar 1: Becoming a Teacher . . . . .	4
EDUC 3023 Proseminar 2: Schools, Culture, and Society . . . . .	4
EDUC 4112-3 Educational Psychology and Adolescent Development (or PSYC 4205) . . . . .	3
EDUC 4122-3 Principles and Methods of Secondary Education . . . . .	3
EDUC 4232 Language and Literacy Across the Curriculum . . . . .	3
EDUC 5385 Methods and Materials in Secondary Science (EDUC 4122 is a prerequisite and EDUC 5312 is a prerequisite or corequisite) . . . . .	4
EDUC 4513 Proseminar 3: Education and Practice . . . . .	2

EDUC 4712 Student Teaching—Secondary (must be taken concurrently with EDUC 4513) . . . . . 12

**Minor Program**

A minor is offered in physics. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

**Graduate Degree Programs**

Graduate study and opportunities for basic research are offered in the areas of nuclear physics, theoretical physics, condensed matter physics, elementary particle physics, plasma physics, atomic and molecular physics, optical science and engineering, laser physics, gravitational physics, fundamental measurements, and liquid crystal science and technology.

Doctoral programs in chemical physics and geophysics are offered jointly with the Department of Chemistry and with the other departments that participate in the interdepartmental geophysics program. For information on these programs, see Interdepartmental Programs in the Graduate School section.

**Departmental Requirements**

Students wishing to pursue graduate work in physics leading to candidacy for an advanced degree should carefully read the requirements for advanced degrees in the Graduate School section. Following are special departmental requirements.

**Master's Degree**

**Prerequisites.** Entering graduate students must have a thorough undergraduate preparation in physics, equivalent to an undergraduate physics major at a recognized college or university. This preparation includes courses in general physics, analytical mechanics, electricity and magnetism, thermodynamics, quantum mechanics, atomic physics, and mathematics through differential equations and complex variables.

**Language.** The department has no foreign language requirement.

**Course Requirements.** There are two separate plans for obtaining the master's degree. Plan I includes a thesis (4 credit hours), PHYS 5210 Theoretical Mechanics, 5250 Introduction to Quantum Mechanics I, and 7310 and 7320 Electromagnetic Theory along with electives (5 credit hours) and mathematics (3 credit hours). The minimum requirement for the master's degree is 30 credit hours. At least 24 hours must be completed at the 5000 level or above. This may include 4–6 thesis hours.

Plan II (without thesis) includes PHYS 5210, 5250, 7310, 7320, and 5260 Introduction to Quantum Mechanics 2 or 7550 Atomic and Molecular Spectra along with mathematics (6 credit hours) and electives (6 credit hours).

All courses must be graduate courses numbered 5000 or above. A maximum of 6 credit hours may be completed at the 3000 or 4000 level as approved by the physics graduate committee for plans I and II.

**Qualifying Examination.** The Graduate Record Examination aptitude tests and advanced test in physics are normally used in place of a qualifying examination, and this examination is normally taken before the time of entry into the Graduate School.

**Comprehensive-Final Examination.** The physics department no longer offers a written qualifying exam. In spring of 2001, the faculty unanimously voted to replace the written exam with required course work. The associate chair may waive courses for students with graduate level equivalents. In addition to abolish-

ing the written exam, the faculty modified the oral exam to better test skills used in professional research. The new examination includes a formal research paper and a formal presentation, followed by a question and answer session. Students usually present a thesis prospectus the semester following the exam.

### Doctoral Degree

**Prerequisites.** Same as for master's degree, above.

**Languages.** The department has no requirement in foreign languages.

**Qualifying Examination.** Same as for master's degree, above.

**Comprehensive Examination.** The comprehensive examination is divided into three parts. Part I consists of the six required courses outlined in the next section. Part II consists of a formal paper summarizing a broad research topic, an oral presentation on the research paper, and an oral exam on the topic and general physics. Part III consists of a thesis prospectus presented to the thesis committee.

Part II of the comprehensive examination must be taken within one year of successful completion of the six required courses described in the next section. Part III will take place early in the semester following Part II. Students with prior graduate education must take Part II in the spring semester following the first semester of course work in this department. Parts II and III of the comprehensive examination may be taken a second time, no more than one year after the first attempt. Students with insufficient preparation may petition for a one-year extension.

**Course Requirements.** To earn a PhD, candidates must complete 30 credit hours of course work and 30 hours of dissertation credit. As part of the course work, the following six courses are required: Theoretical Mechanics (PHYS 5210), Statistical Mechanics (PHYS 7230), Quantum Mechanics I and II (PHYS 5250 and 5260), and Electromagnetic Theory I and II (PHYS 7310 and 7320). In addition to satisfying the Comprehensive Examination requirements, candidates must complete these courses with a grade of B- or better in each in order to advance to candidacy. For a PhD, students with strong undergraduate preparation or previous graduate level work may petition to waive required courses.

At least 27 of the 30 credit hours of course work must be 5000-level or above physics courses, and the six required courses total 18 hours. All courses, required or otherwise, must be passed with a grade of B- or better, and a course may be repeated only once.

**Final Examination.** The final examination is oral and covers the thesis.

## Political Science

*Degrees* ..... BA, MA, PhD

The Department of Political Science offers instruction and research in the art and science of politics. Work within the department is organized around six basic fields: American government and politics, comparative politics, international relations, public policy, political theory, and empirical theory and methodology. In addition to excellence in the traditional fields, the department is committed to a cross-field emphasis on globalization and democratic governance.

The department participates in the distributed studies program. Programs leading to the MA and PhD degree are offered.

At the most general level, the goal of the undergraduate curriculum in political science at the University of Colorado at Boulder is to offer students the opportunity to develop an ap-

preciation of politics and government and of the students' roles within them.

The undergraduate degree in political science emphasizes knowledge and understanding of:

- the values and beliefs that constitute the Western political tradition, and alternative ideologies and belief systems;
- the institutions and processes of the American political system and its strengths and weaknesses in the 21st century;
- other political systems, both Western and non-Western, which are members of the world community, our allies and competitors in international relations, and through comparative analysis offering a source of insight into American society and politics;
- the patterns of interaction among members of the world community, the causes of war and peace, and the sources of international conflict and cooperation; and
- the domestic and international policy issues facing the United States and the world community, and the ability to make reasoned judgments—integrating facts and values, means and ends—regarding policies to address those problems.

In addition, students completing the degree in political science are expected to acquire the ability and skills to:

- evaluate conflicting arguments, assemble and present empirical evidence, and make reasoned conclusions from the evidence available; and
- communicate effectively, both orally and in written form.

Students interested in political science may want to consider the Global Studies Residential Academic Program. See Residential Academic Programs in this section for more information.

## Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
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Students in the regular political science major must complete 36 credit hours in the department, of which 21 hours must be in upper-division courses. All 36 hours must be completed with grades of C- or better and an overall grade point average of 2.000. None of the required hours may be taken pass/fail.

Twelve hours are required from the following lower-division fields:

### American

PSCI 1101 The American Political Systems. . . . . 3

### Comparative

PSCI 2012 Introduction to Comparative Politics . . . . . 3

### International

PSCI 2223 Introduction to International Relations . . . . . 3

### Theory

PSCI 2004 Survey of Western Political Thought . . . . . 3

Of the required 21 upper-division hours, students must take one course in at least four of the primary fields with two courses in one primary field. The primary fields are: American, comparative, international relations, theory, methodology, and policy.

Required courses in addition to political science courses:

ECON 2010 Principles of Microeconomics . . . . . 4

ECON 2020 Principles of Macroeconomics. . . . . 4

## Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain



adequate progress in political science, students should meet the following requirements:

Declare major by the beginning of the second semester.

Complete PSCI 1101 and two of the following required courses by the end of the third semester: PSCI 2012, 2223, or 2004.

Complete the remaining lower-division political science course and the two ancillary courses, ECON 2010 and 2020, by the end of the fourth semester.

Complete 12 upper-division credit hours of political science courses, including at least one course in three of the following fields by the end of the sixth semester: American, Comparative, International Relations, Theory, Methodology, and Public Policy.

Complete 12 credit hours of political science courses, including at least 9 upper-division credit hours and all remaining upper-division field distribution requirements during the seventh and eighth semesters.

Students seeking to combine a political science major with a social science certification in education should consult an undergraduate advisor in political science.

### Minor Program

A minor is offered in political science. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. For more information, see [www.colorado.edu/artsscience/students/undergraduate/academics/minors.html](http://www.colorado.edu/artsscience/students/undergraduate/academics/minors.html).

### Graduate Degree Programs

Applications for the MA and PhD degrees are accepted from qualified and motivated students wishing to probe deeply into the analysis of political life. Professional courses in the graduate curriculum range from problem definition in policy analysis to the study of the global political economy. The curriculum is structured to lead to the PhD degree and also offers several programs culminating in the MA degree. In addition to the regular master's degree in political science, special focus is placed on two professionally oriented MA degrees: one oriented toward entry into the public sector as a policy analyst; and one that prepares students for careers in global affairs.

Students wishing to pursue graduate work toward one of these degrees should read carefully the Graduate School requirements for admission and degrees in this catalog. In addition, they should refer to the departmental website for additional information on graduate programs.

### Departmental Admission Requirements

Applicants to the graduate program in political science should normally present evidence of at least 18 credit hours of course work in political science or in related fields, 9 of which should be at the upper-division level. In addition, the department requires applicants to present quantitative and verbal GRE scores that total at least 1100 and that show a score of at least 500 on the verbal section. Three letters of recommendation, an undergraduate grade point average of at least 3.00, official transcripts, and a short essay detailing interests and plans also are required to complete the application packet. Foreign applicants must supplement their application by presenting TOEFL scores or other proof of English proficiency. Online applications should be submitted to the department by December 31. Decisions regarding admission and financial aid are typically completed during March each year.

### Master of Arts in Political Science

Students shall concentrate in any one of seven political science fields and take 3 credit hours of work in regularly scheduled political science seminars in each of three areas defined as follows:

American politics, public policy, law and politics, international politics, comparative politics, political philosophy, and empirical theory and methodology.

Students are responsible for familiarizing themselves with all degree requirements, some of which are outlined in the Graduate School section of this catalog. In brief, the degree requirements include a minimum of 31 credit hours of graduate credit, including at least 24 credit hours at the 5000 level or above (at least 15 credit hours of work must be in regularly scheduled political science seminars), and 4 credit hours for the MA thesis. Students may take up to 6 hours in political science graduate research topics, and up to 6 hours in a cognate discipline (senior undergraduate course, or independent study), but not more than a total of 9 hours combined. The 9 credit hours may not be substituted for required seminars. MA students on assistantship are required to take PSCI 7008 Teaching Political Science.

A thesis based on original investigation and showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research, is required.

Students select a faculty advisor from among the regular members of the department graduate faculty at the earliest possible date, but no later than the end of the second week of the second semester of residence. The faculty advisor must have general competence in the student primary field of emphasis and serves as the first reader of the MA thesis. The second reader, who likewise has general competence in the topic of the MA thesis, must be associated intimately with the thesis from its inception and in no case after the student begins writing. The completed draft of the thesis must be in the hands of the second and third readers at least four weeks prior to the comprehensive-final examination.

Each candidate for a master's degree is required to take a comprehensive-final examination *after* the other requirements for the degree have been completed. This examination may be given near the end of the last semester of residence while the candidate is still taking required courses for the degree, provided satisfactory progress is being made in those courses. The examination is oral and lasts approximately two hours. It concentrates on the student field of emphasis as well as the MA thesis. The comprehensive-final examination committee has three members, including the faculty advisor (the chair) and the second reader of the thesis. At least two committee members must be chosen from among regular members of the graduate faculty of this department, in consultation with the faculty advisor; the third committee member may be a graduate faculty representative from a cognate discipline. Satisfaction of the examination requires the affirmative vote of each of the three committee members.

### Master of Arts in Political Science (International Affairs)

The increased participation of the United States in world politics has opened a variety of new careers in international affairs. The master's program in international affairs of the Department of Political Science is designed to provide a well-rounded education in international affairs for students who are seeking careers of international service with the national government, with international organizations, with private business, with nongovernmental organizations, or in the fields of teaching and research. This MA program is also a logical step toward obtaining a PhD in political science at the University of Colorado or elsewhere.

Degree requirements include a minimum of 31 credit hours of graduate credit, 24 of which must be at the 5000 level or above. Of the required 31 credit hours, students desiring an MA in political science (international affairs) must include, in ad-

dition to the required seminars, 12 credit hours of work in the international area and 9 of the 12 credit hours must be in the field of international relations. It is advisable for the student to include the international relations core seminar in the 9 hours in the field of international relations. If a student plan of study so indicates, and permission is granted by the student faculty advisor and the department chair, the student may substitute up to 6 hours of credit from another department for the 3 hours in each of the other two areas of study.

Each student in this program must pass a GSFLT proficiency test in a foreign language approved by the student advisors and/or present evidence of an advanced proficiency in social statistics or computer science. The latter proficiency may be achieved by obtaining a B or better in a sequence of courses to be identified by the student's advisory committee. A list of the course sequences that have been approved to meet this requirement is available in the departmental office. In exceptional cases, the graduate curriculum committee may accept other evidence that the student has acquired a good working knowledge of a foreign language or the advanced proficiency in social statistics or computer science.

### *Master of Arts in Political Science (Public Policy)*

The goal of the MA program in public policy is to train professional policy analysts for nonacademic careers. The curriculum is designed to provide the analytical skills necessary to participate responsibly and effectively in the policy process. The MA in political science (public policy) may be taken concurrently with the interdisciplinary graduate certificate program in environmental policy.

This is an MA with thesis, requiring 33 credit hours. It includes 27 hours of course work, 2 hours in an applied research internship, and 4 hours of thesis credit. Completion of these requirements normally takes two years and at least one summer.

The core curriculum consists of five required seminars in policy analysis, introduction to data analysis, and context-sensitive methods. Specific courses in economics are not required, but there is a strong expectation that all students should be familiar with the tools of economic analysis, particularly in the policy area in which they are interested. The remaining 12 hours of electives should be used to develop additional analytical skills and/or a specialization in the student's area of substantive interest. The certificate program in environmental policy provides one alternative for substantive specialization, drawing on courses in economics, philosophy, geography, and the law school. The internship is a supervised applied research project for a policy client, which should lead into the thesis project.

The thesis is a research report on a policy problem that provides concrete demonstration of the student analytical skills, intellectual perspective, and substantive knowledge. As a general rule, the policy thesis is somewhat shorter (but not less analytical) than a standard MA thesis.

### *Doctor of Philosophy*

For the PhD, the Department of Political Science requires at least 42 hours of course work (with a grade of A or B) beyond the bachelor's degree. Except for 3 credit hours that may be taken at the senior undergraduate level in a cognate field at this university, all 42 hours must be at the 5000 level or above. Not to be included in the 42 hours are dissertation and research hours, master's thesis hours, or those hours used to fulfill the language requirements.

The PhD candidate must present three fields of competence. The first two, labeled the major field and second field, are to

be the subject of the PhD comprehensive examination. A minimum of three seminars must be presented in these fields. Additional course work is anticipated in the major and second fields. Competence in the third field may be demonstrated by completing two graduate seminars in that field with a GPA of 3.50 or higher, or through comprehensive examination. Each student shall select three course seminars from the following seven concentrations: American politics, public policy, law and politics, international politics, comparative politics, political philosophy, and empirical theory and methodology.

Students taking comprehensive exams will have the option of offering a "thematic" cross-field topic for the second exam field for their written and oral comps, with the agreement of their advisor. To do so, students must still meet the three-course minimum for a second field from the seven designated fields before the last day of the semester prior to taking comps, submit to the director of graduate studies a written agreement with an advisor on a reading list appropriate for the cross-field examination and a list of names of political science faculty conversant with the topic who have also approved the reading list. Approval of the cross-field topic is at the discretion of the director of graduate studies; the minimum criteria include bringing together two distinct fields of study. The director of graduate studies will select the committee for the written and oral exams in this cross-field exam, as for the other field exams.

Of the 42 required hours, 35 hours must be taken in political science. Of this 35, 32 must be in regularly scheduled seminars. Not more than 6 hours of political science graduate research topics combined are allowed toward the degree. The maximum amount of work that may be transferred to this university for the PhD is 21 semester hours.

**First-Year Requirements.** All graduate students in the PhD program are required to take PSCI 7008 and three core field seminars. At least two of the core seminars must be in the fields of American politics, comparative politics, and international relations. During the first year in residence, two core seminars in at least two fields must be completed. Also during the first year in residence, students enrolled in the PhD program must take PSCI 7075 (Introduction to Professional Political Science) and PSCI 7085 (Introductory Data Analysis).

**Qualifying PhD Research Paper.** Each PhD student is required to select a topic that leads to the formulation, execution, and written presentation of a piece of original research. This research paper is expected to be of potentially publishable quality.

The research paper is read by the student's three-person advisory committee, consisting of the student's major advisor, a second major field reader, and a representative of the student's second field of concentration. Following consideration of the written work, an oral examination is conducted by the advisory committee to test both the depth of the student research as well as the breadth of the student's general training. Competence in core seminar materials is expected.

The oral examination committee is charged with the task of evaluating the potential of each PhD student. Students whose work is deemed inadequate are asked to leave the program.

Students who have not previously earned a master's degree in political science are eligible for a plan II MA upon completion of 32 hours of graduate course work. The awarding of the Plan II MA is at the discretion of the examining committee. This decision is independent of the decision to encourage or discontinue the student in the PhD program.

**Advisory Committee.** The role of the advisory committee is crucial; its function is to guide students through their degree

programs. Students select a chair for the committee no later than the end of the second semester in residence. If a student does not select a chair during the time specified, the departmental chair will designate such a chair for the purpose of administration and advising.

The advisory committee consists of three regular faculty members in residence who are members of the political science graduate faculty and who each represent one of the student fields of concentration. The second and third members of the advisory committee are selected by the student with the approval of the chair of the committee. The advisory committee meets with the student at least once during each academic year to review the student's progress and to assist in planning the student's future course of study.

**Research Competence.** Each PhD student must fulfill the research competence requirements as determined in conjunction with the advisory committee.

Methodological competence is demonstrated by completing PSCI 7095 with a grade of *B* or better, and requires completion of at least two advanced methods courses beyond PSCI 7085.

Language competence is evidenced by completion of a fourth-semester college-level language course of 3 or more credit hours with a grade of *B* or better, high GSFLT scores for the language, high scores on another standardized examination recognized by University of Colorado language departments, or other evidence of competence in the language. Advanced competence is demonstrated by completion of at least a fifth-semester language course or other work deemed appropriate by the advisory committee.

The competence requirement also may be met by demonstrating basic competence standards in both methodological and language skills (i.e., by completing PSCI 7095 and fourth-semester foreign language skills).

Committees may set higher research competence standards for the student than those outlined above.

The competence standard must be communicated in writing to the Director of Graduate Studies by the end of the second year in residence. Both the principal advisor and the student must signify that they accept the committee determination of research competence standard. Required course work (or its surrogate) must be completed no later than the semester in which the PhD comprehensive examination is taken.

**Comprehensive Examination.** The comprehensive examination serves to demonstrate that students have acquired the skills and knowledge necessary to function as independent scholars in political science generally and in their chosen fields of specialization. Broad knowledge is expected as well as a critical understanding of the literature and the ability to apply that understanding to the central, enduring questions of politics and government.

Comprehensive examinations are administered once each semester. Written comprehensive examinations are administered once each semester during the first week of classes. Oral examinations are scheduled individually, within three weeks of the completion of the written part of the examination.

A final grade of *pass* or *fail* is assigned following the orals. Students who fail the written exams are provided a single opportunity to retake them, and are given an explanation of the failure by the readers.

**Dissertation Requirements and Final Examination.** A dissertation based on original investigation and showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research, is required. A candidate for the PhD selects a dissertation topic in consultation with a dissertation advisor

who is rostered in the student's primary field of emphasis, a second reader who has general competence in the dissertation topic, and at least one additional faculty member rostered in the student's primary field of interest. The dissertation advisor submits the topic, along with the names of the second reader and other faculty consulted in its selection, to the director of graduate studies for approval. These steps must be completed at least eight months prior to the dissertation defense.

Once the dissertation has been accepted tentatively by the first two readers, a final oral examination is conducted by the dissertation committee. Approved by the dean of the Graduate School, the committee shall consist of not fewer than five representatives from those departments in which a student has worked, including at least one professor of authority outside the political science department who qualifies for university graduate faculty membership.

The examination is open to the public. More than one dissenting vote from the committee disqualifies the candidate in the final examination.

## Psychology and Neuroscience

*Degrees* ..... BA, MA, PhD

Psychology is a science that studies behavior from both biological and social perspectives. The major and elective requirements are designed to achieve a broad understanding of the contents, concepts, and research methods of contemporary psychology in the context of a quality liberal arts education. Note that no terminal master's degree is offered except for the concurrent BA/MA program in cognitive psychology.

Students contemplating postgraduate education, either in professional or in graduate school, are encouraged to participate in the departmental honors program, which provides special opportunities for individualized attention.

CU-Boulder's Department of Psychology and Neuroscience has been ranked by the National Academy of Sciences as one of the best in the country with respect to the quality of the faculty and their scholarly productivity. Moreover, the department offers undergraduates a wide range of opportunities for involvement in research.

The undergraduate degree in psychology emphasizes knowledge and awareness of:

- the social and biological background of human nature;
- the research bases necessary for understanding and predicting behavioral outcomes;
- descriptive and inferential statistics, including measures of central tendency, variance, and correlation;
- psychology as a laboratory science and of the interplay between theory and research;
- possible practical applications of research knowledge;
- the influences of interactions between attributes of the social situation and psychological attributes of a person in generating human behavior and subjective experience;
- the development and amelioration of abnormal thoughts, feelings, and behavior;
- the mechanics of heredity, neural transmission, plasticity, development, and aging;
- a reasonable integrated historical overview of modern psychology, including the major subdivisions of the discipline and their interrelations;

- major ideas and scholars in the discipline subfields and the relationship of ideas from one area to another; and
- the ethical issues germane to research investigation raised by the applications and practice of psychology as a profession.

In addition, students completing the degree in psychology are expected to acquire the ability and skills to:

- evaluate critically research designs, results, and interpretations;
- design and carry out research on their own;
- know when to use basic statistical tests, to formulate hypotheses, collect and analyze data, draw conclusions, and clearly communicate research findings;
- assess the characteristics of social situations and measure the psychological attributes of individuals;
- use the primary literature of biological and developmental psychology to prepare a clear written summary of a research topic; and
- place current psychological concerns into an appropriate overarching conceptual framework that encompasses the entire field.

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. These requirements apply to all psychology majors who declare their major after May 16, 1998. Those majors who declared before that date have the option of completing their major under either the old rules or the new rules.

#### Required Courses

#### Semester Hours

In order to graduate with a degree in psychology, the department requires that students fulfill the following course requirements with a grade of C- or better. Additional explanatory notes are available in the department advising office, Muenzinger D243.

The department recommends taking PSYC 1001, 2012, 2145, and 2606 by the end of the sophomore year, and 3101 by the end of the junior year.

PSYC 1001 General Psychology . . . . .	4
PSYC 2012 Biological Psychology . . . . .	3
PSYC 2145 Introductory Cognitive Psychology. . . . .	3
PSYC 2606 Social Psychology . . . . .	3
PSYC 3101 Statistics and Research Methods in Psychology. . . . .	4

One of the following:

PSYC 3102 Behavioral Genetics . . . . .	3
PSYC 3313 Psychopathology . . . . .	4

At least one course from the following upper-division laboratory and methods courses:

PSYC 3001 Honors Research Methods Seminar, PSYC 4052 Behavioral Neuroscience, PSYC 4136 Human Judgment and Decision-Making Lab, PSYC 4145 Advanced Cognitive Psychology, 4155 Cognitive Neuroscience/Neuropsychology, PSYC 4165 Psychology of Perception, PSYC 4175 Computational Cognitive Neuroscience, PSYC 4376 Research Methods in Social Psychology, PSYC 4443 Research Methods in Clinical Psychology, or PSYC 4733 Psychological Testing and Assessment . . . . .	4
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Additional electives to bring total hours in psychology to at least 31, but not more than 45, of which at least 18 must be upper division. (Students are encouraged to use independent study to gain field or laboratory experience. However, independent study hours are *pass/fail* credit only and cannot be used toward the 31 hours required for graduation.)

In addition to the course requirements listed above, and the minimum of 31 hours in psychology, the student is required to pass one of the following natural science sequences with a grade of C- or better:

CHEM 1011 and 1031 Environmental Chemistry 1 and 2

CHEM 1051 and 1071 Introduction to Chemistry and Introduction to Organic and Biochemistry

CHEM 1111 and 1071 General Chemistry 1 and Introduction to Organic and Biochemistry

CHEM 1113 and 1133 General Chemistry 1 and 2

EBIO 1210 and 1220 General Biology 1 and 2 (formerly EPOB 1210 and 1220)

MATH 1300 and 2300 Analytical Geometry and Calculus 1 and 2

MCDB 1150 and 2150 Introduction to MCD Biology 1 and Principles of Genetics

MCDB 1150 and EBIO 1220 Introduction to MCD Biology 1 and General Biology 2

PHYS 1110 and 1120 General Physics 1 and 2 (science and engineering majors only)

PHYS 2010 and 2020 General Physics 1 and 2

*NOTE: Transfer students must complete a minimum of 12 upper-division hours of psychology course work on the Boulder campus with a C- or better. Of those 12 hours, one laboratory and methods course and either PSYC 3102 or PSYC 3313 must be included.*

### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in psychology, students should meet the following requirements:

Declare the major by the beginning of the second semester.

Complete PSYC 1001, 2012, 2145, 2606, and the natural science sequence during the first two years of study.

Complete PSYC 3313 or 3102, the laboratory and methods course, and at least two upper-division PSYC electives during the junior (third) year. (If students are unable to enroll in these courses due to oversubscription during the junior year, they will have top enrollment priority the senior year.)

Complete remaining elective requirements during the senior year.

### Concurrent BA/MA Program with Specialization in Cognitive Psychology

A concurrent BA/MA in psychology, with specialization in cognitive psychology, is offered. Both the BA and MA degree must be completed within a five-year period. In recent years, both basic and applied research in cognitive psychology have come to rely increasingly on related findings, theories, and methods in other cognitive science disciplines, including philosophy, computer science, and linguistics.

The purpose of this degree program is to provide training that prepares students either for continuing doctoral study in cognitive psychology or for technical careers involving cognitive psychology in government and industry. Students complete the requirements for an undergraduate major in psychology, an interdisciplinary undergraduate certificate in cognitive science, and a master's degree in the cognitive psychology graduate training program. Because of the demanding nature of this program, only highly qualified students are admitted.

### Graduate Degree Programs

#### PhD Programs

Students are admitted for graduate studies leading to the PhD in one of five fields: behavioral genetics, behavioral neuroscience (including learning and motivation), clinical, cognitive, and social psychology. Note that no terminal master's degree program is offered. The behavioral genetics program focuses on the study of genetic contributions to individual differences in behavior. The fundamental tenet of the behavioral neuroscience program is that a complete understanding of behavior entails unraveling mechanisms and principles at any and all levels of organization (i.e., behavior, neuroanatomy, neurophysiology,

neurochemistry). The major training goals of the clinical psychology program follow the Boulder model in that the preparation of scientist-practitioner is stressed. The clinical psychology program is accredited by the American Psychological Association. The cognitive psychology program includes course work and research in the following areas of cognition: problem solving, thinking, human learning and memory, judgment and decision making, language, artificial intelligence, reading, attention and performance, perception, and information processing. The program in social psychology trains students to conduct research, either applied or basic, in the fields of social cognition, self-concept development, close relationships, and health. Additional courses in the department offer graduate training in the knowledge, theory, and research methodology relating to cultural influences on behavior.

### Requirements for the PhD Degree

All students are admitted with the expectation that they will work toward the PhD degree. Many students receive a master of arts degree in the course of working toward the PhD. Students who receive the PhD degree must demonstrate that they are proficient in some broad subject of learning and that they can critically evaluate work in this field; furthermore, they must show the ability to work independently in their chosen field and must make an original contribution of significance to the advancement of knowledge.

In the first year of graduate study, all psychology graduate students enroll in a two-semester graduate statistical sequence. There is a first-year research requirement that starts the student on an active program of research. The student also must enroll in a sequence of courses designed to give exposure to various research topics and methods.

Before admission to candidacy for the PhD degree, the student must pass a comprehensive examination in the field of concentration and related fields. This examination tests the student mastery of a broad field of knowledge, not merely the formal course work completed.

A variety of advanced research seminars are taught on a regular basis. Students are required to be enrolled in at least one substantive course in the department each semester until the comprehensive examinations have been successfully completed. Upon completing the comprehensives, students engage in the dissertation research, culminating in a public oral defense.

## Religious Studies

*Degrees*..... BA, MA

The curriculum in religious studies includes the study of traditions such as Buddhism, Christianity, Confucianism, Daoism, Hinduism, Islam, Judaism, and Native American and other traditional religions. The program examines topics such as ritual studies, peace studies, dance, religion and literature, women and religion, and religion and psychology.

The undergraduate degree in religious studies emphasizes knowledge and awareness of:

- the academic study of religion and the related writing and critical skills directed toward one area of concentration (tradition, issue, or theme); and
- different theoretical and methodological approaches to the study of religion.

In addition, students with a degree in religious studies are expected to acquire the ability and skills to:

- identify textual, performative, and artifactual data relevant to the study of religion;
- draw connections between different historical and/or cultural contexts of religion; and
- communicate data analysis and interpretation competently in written form.

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

#### Major Requirements

Students must complete at least 36 hours of religious studies course work including the following required courses and projects:

Three required seminars in the Academic Study of Religion

**RLST 3020 Advanced Writing in Religious Studies** (taken at the first available offering after declaring major and reaching junior status). This course, which also fulfills the advanced writing requirement, focuses the development of writing skills on the introduction and preparation of students for a major in the academic study of religion. Taught fall semester.

**RLST 4800 Critical Studies in Religion** (taken in the junior year). This course, which also fulfills the critical thinking requirement, provides experience in the academic study of religion through the exploration of contemporary models and issues that demonstrate the excitement and promise in this field. Taught spring semester.

**RLST 4830 Senior Majors Seminar** (taken the last year as an undergraduate after all other requirements have been met). This course involves students in an extensive exploration of the academic study of religion. The topic will be selected by the faculty person offering the course including a careful consideration of the theoretical dimensions of the work presented in historical context. Student papers culminating the concentration area are presented at the conclusion of this course. Taught spring semester.

**Concentration Area**—three courses (9 hours). With the consultation and approval of an undergraduate advisor, three RLST courses are to be selected so that the courses build competence in a designated area of concentration. A 10-page paper reflects on the coherency of the select area including how the three courses taken interrelate and how the area of concentration relates to the academic study of religion. The paper is the basis for capstone discussion during the last weeks of Senior Seminar.

#### Graduating in Four Years

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in religious studies, students should meet the following requirements:

- Declare the major at the beginning of the second semester of study.
- Complete two religious studies courses each semester.
- Take the senior seminar the last spring semester in residence.

#### Minor Program

Students must complete at least 18 credit hours in Religious Studies course work, including at least 6 hours of lower-division and 9 hours of upper-division work. At least 12 hours must be taken in the CU Department of Religious Studies.

#### Graduation with Honors

The honors program in religious studies offers the opportunity for highly motivated undergraduates to undertake a deeper and more individualized study than is provided by the regular BA curriculum and to earn an honors designation on their diploma. Religious studies majors with at least a 3.300 overall grade point average and 3.500 in the major are eligible to participate in the

program. Honors that may be earned are cum laude (with honors), magna cum laude (with high honors), and summa cum laude (with highest honors).

Students interested in pursuing departmental honors are encouraged to consult with the departmental undergraduate advisor by the beginning of their junior year.

## Graduate Degree Program

### *Master's Degree*

A graduate degree represents the mastery of a significant body of knowledge and interpretation within an academic discipline. A degree is not granted merely because a student completes a specific number of courses. Students should not expect to gain all knowledge and training necessary for the degree from formal courses alone. The student is expected to acquire both breadth and depth in religious studies. Breadth is achieved by satisfying two types of course requirements as set forth in 2 below, which include exposure to a diversity of approaches to the study of religion. Depth is achieved through three courses in a particular area or approach and by independent work related to the thesis or concentration, as set forth in 3 below. Listed below are the minimum formal requirements for the MA degree in religious studies.

1. The student must successfully complete 31 semester hours of academic work, at least 24 of which must be completed at the 5000 level or above.
  - Up to 9 credit hours of course work may be taken outside the department or transferred from another accredited institution, consistent with the student's special needs and interests and with the advisor's approval. Independent study credit hours shall not exceed six hours.
2. To insure breadth of learning, the student must successfully complete two types of required courses:
  - Approaches. RLST 6830 Introduction to the Academic Study of Religion, offered every fall term. This course should be taken the first fall term the student is in residence.
    - Three seminars in the academic study of religion. At least one seminar will be designated each semester.
3. To ensure depth of learning, the student must successfully complete two types of required courses:
  - Three research concentration courses (to be determined in consultation with one's advisor). These may be taken in or out of the department, as appropriate.
    - In the final semester of graduate study, which must be taken in residence, students will select either a thesis or non-thesis research option. Those selecting the thesis option will take a 4-credit thesis course, which will culminate in the completion and defense of a thesis. Those selecting the non-thesis option will take a 4-credit directed readings course on secondary scholarship in a specific field (theoretical topic, geographic area, or religious tradition) which will culminate in the successful passing of a written examination on this topic.
4. A final oral comprehensive examination, given by the student's research committee, will focus on three substantial term papers and either the thesis or the written examination in a specific field.
5. Courses for each term must be approved by the student's faculty advisor and be in compliance with the requirements of the Graduate School where necessary. In order to register for any given term, the student must have the course of study for that term approved in writing by the advisor on the student's "Record of Progress Toward the MA Degree" form. No changes can be made in registration without the advisor's approval.
6. In order to receive the degree a student must meet the foreign language requirement. The student must have a satisfactory reading knowledge of a language other than English, demonstrated by a *B* or better in the fourth semester of the language, or by successful completion of a translation exam on material related to the student's field; and material in the language must be employed in a significant way in the thesis or other project.
7. All students must fulfill the residency requirement. In general this can be fulfilled by either two full-time semesters or four part-time semesters of study. A full-time program is defined as either five hours of course work

at the 5000 level or higher, eight hours of total course work, or at least one hour of thesis research.

A student who has not completed at least 12 semester hours, or the equivalent, of undergraduate academic course work directly related to the study of religion will be required to do remedial work to make up this deficit before beginning graduate study, or, with the director of Graduate Studies' permission, after beginning the program. This can be done by attaining a grade of *B* or better in an appropriate 2000- or 3000-level course taken within the first year. Remedial courses may not be counted toward the degree.

### *Dual Master's Program*

The Department of Religious Studies also participates in a dual master's degree program with the Departments of History and East Asian Languages and Civilizations. Students interested in exploring this option should contact the graduate director of the department for specific requirements.

## Concurrent Bachelor's/Master's Degree Program

A concurrent bachelor's/master's degree program offers a select group of exceptional undergraduates the opportunity to begin graduate work while still an undergraduate and thereby complete the BA and MA degrees simultaneously and on an accelerated schedule. The entire program normally requires five to six years and permits 6 credits to be double-counted toward both degrees. Otherwise requirements for the two degrees remain unchanged.

### *Admission to the Program*

Applicants to the program must be full-time, continuously enrolled students with a minimum overall GPA of 3.000, and a 3.500 GPA in RLST courses. They must have completed at least 24 credit hours prior to admission to the concurrent BA/MA degree program, and must have satisfied any MAPS deficiencies. Applications will include letters of recommendation from RLST faculty and will be evaluated by faculty as a whole, much as graduate applications are.

### *Continuation in the Program*

Students enrolled in the concurrent BA/MA program must maintain a minimum cumulative GPA of 3.250, and 3.500 in the department. Concurrent degree students may not participate in the Time Out program; exceptions may be granted by the CDAC (Concurrent Degree Appeals Committee) based on a review of extenuating circumstances. Each BA/MA student will be assigned a graduate advisor with whom to meet regularly and will be required to demonstrate satisfactory progress toward degree to the advisor within the framework of the department's graduate student assessment policies.

### *Curriculum*

Students enrolled in the concurrent BA/MA program are permitted to double-count 6 credits of course work, thereby reducing the total amount of RLST course work to  $(36 + 31 - 6) = 61$  credit hours. One of these courses must be RLST 6830 Intro to the Academic Study of Religion, which would replace Senior Seminar for BA/MA students, and the other must be in an area of depth concentration. Otherwise program students will fulfill all the normal requirements for the BA and the MA degree.

**Scandinavian (now Nordic Studies)**

See *Germanic and Slavic Languages and Literatures*.

**Sociology**

*Degrees* ..... BA, PhD

The undergraduate degree in sociology emphasizes knowledge and awareness of:

- the basic data, concepts, theories, and modes of explanation appropriate to the understanding of human societies;
- the structure of modern American society, its social stratification, its ethnic, racial, religious, and gender differentiation, and its main social institutions—family, polity, economy, and religion;
- the basic social processes that maintain and alter social structure, especially the processes of integration, organization, and conflict; and
- the diversity of human societies, including the differences between major historical types such as foraging, agricultural, industrial, and post-industrial societies.

In addition, students completing the degree in sociology are expected to acquire the ability to:

- locate and consult works relevant to a sociological investigation and write a sociological paper that is coherent, cogent, and grammatically correct;
- understand the basic procedures of sociological research and analyze sociological data;
- understand and interpret the results of sociological research; and
- integrate and evaluate sociological writings.

**Bachelor’s Degree Program**

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below. A minimum of 36 credit hours (but not more than 45) in sociology is required for the degree. Of the 36 semester hours, 21 must be upper division with a minimum of 15 upper-division credit hours of course work in the major taken on the Boulder campus. All required major courses must be completed with a grade of C- or better. The cumulative GPA required in sociology courses is 2.500.

<i>Required Courses</i>	<i>Semester Hours</i>
SOCY 1001 Introduction to Sociology . . . . .	3
SOCY 2061 Introduction to Social Statistics or SOCY 4061 Social Statistics. A non-SOCY statistics course (C- grade or higher) can be used to substitute for SOCY 2061 or 4061 if one additional SOCY course is taken.	3
SOCY 3001 Classical Theory . . . . .	3
SOCY 3301 Survey Methods or SOCY 3401 Field Methods . . . . .	3
Electives . . . . .	24

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in sociology, students should meet the following requirements:

Declare the major by the beginning of the second semester.

- Complete SOCY 1001 and 3001 and 6 credit hours of sociology electives by the end of the fourth semester.
- Complete SOCY 2061 or 4061 and either 3301 or 3401 and 15 credit hours, with a minimum of 9 upper-division credit hours of sociology electives, by the end of the sixth semester.
- Complete 36 credit hours (but not more than 45), in sociology with at least 21 credit hours in upper-division courses by the end of the eighth semester.

**Graduate Degree Program**

Students wishing to pursue graduate work in sociology leading to candidacy for an advanced degree should carefully read the requirements for advanced degrees in the Graduate School section.

The following are additional requirements for admission to the graduate degree programs of the department:

- A combined grade point average of at least 3.00 (B) for all courses in sociology undertaken as an undergraduate or graduate student prior to admission.
- Satisfactory scores (as determined by the department) on the Graduate Record Examination, including both the verbal and quantitative sections.
- Proficiency in statistics as demonstrated by a grade of B or better in an undergraduate statistics course.

The deadline for applications is December 15 for the academic year.

**Master’s Degree**

The Department of Sociology does not have a master’s degree program. However, students may obtain the MA degree in transit to the PhD if they wish, and students unable to complete PhD requirements may pursue a terminal MA degree, pending approval by the Graduate Committee. The department does not allow extra time for the completion of the MA degree.

All MA students are required to complete a minimum of 30 semester hours of graduate credit. These 30 hours must include at least 6 credit hours in at least two seminars in the student’s major fields. Students may take a maximum of 6 hours of independent study. These may not be substituted for required seminars. In addition, all students must take courses from at least four different members of the faculty. Finally, all MA students must designate a Master’s Advisory Committee. This committee must consist of at least three regularly appointed graduate faculty members from the Department of Sociology.

**Plan I—Thesis Option**

For the MA degree, a student must complete 24 hours of course work at the 5000 level or above, including the required Theory and Methods sequence, and at least 4 and a minimum of 6 hours of thesis credits. Students must register for thesis credit hours in the semester of thesis defense.

**Plan II—Non-Thesis**

For the MA degree, a student must complete 30 hours of course work at the 5000 level or above, including the required Theory and Methods sequence, and take a written exam in their major area within sociology. The Advisory Committee, here constituted as an examining committee, creates an exam that will assess the candidate’s competence in the relevant areas of sociological knowledge.

**Doctoral Degree**

- The main requirements for the doctoral degree are:
- A minimum of 45 credit hours at or above the 5000 level. At least 24 of these 45 hours must be taken in the sociology department at CU-Boulder.
- The following required courses must be included in the 45 hour minimum: 6 hours of sociological theory (including SOCY 5201); 9 hours of research methods and statistics (SOCY 5031, 5111, and 6111); two 2-hour graduate forums (SOCY 6821); and one 1-hour proseminar (SOCY 6831).
- A student must have passed all first-year work with a 3.500 GPA and no grade lower than a B to continue into the second year.

Successful completion of exams in sociological theory and methods by the end of the first year.

Successful first-year and second-year reviews.

A student must pass the comprehensive examination, having become eligible to take this examination only after having satisfied requirements 1, 2, and 3 above.

A student must write a PhD dissertation and defend this dissertation in an oral examination.

A detailed description of the PhD program is given in the graduate handbook available from the graduate program assistant of the sociology department. All inquiries about graduate programs should be addressed to the Graduate Program Assistant, Department of Sociology, University of Colorado at Boulder, 327 UCB, Boulder, CO 80309-0327 or by e-mail to [sociology@colorado.edu](mailto:sociology@colorado.edu). For more information, visit the department website at [socsci.colorado.edu/SOC](http://socsci.colorado.edu/SOC).

## Spanish and Portuguese

*Degrees in Spanish*..... BA, MA, PhD

**Portuguese:** Although no major in Portuguese alone is offered, the department offers a combined Spanish and Portuguese Language and Culture degree option (see the Spanish Majors section). Language courses at the elementary and intermediate levels are also available, as well as senior and graduate courses in Luso-Brazilian civilization and literature.

**Arabic Language and Culture:** Although no major in Arabic is offered, the department offers a number of courses in Language and Culture. The language courses are at the elementary and intermediate level.

The department has identified the following as educational outcomes for the three tracks within the Spanish major.

The undergraduate degree in Spanish language and literature emphasizes knowledge and awareness of:

- the fundamental outlines of the history of Spanish literature or of Spanish American literature;
- the major creative writers in either Spanish or Spanish American literature;
- basic critical methodologies in the study of poetry, drama, narrative fiction, and the essay; and
- the social and historical contexts in which particular literary traditions developed.

In addition, students completing the degree in Spanish language and literature are expected to acquire the ability and skills to:

- read sophisticated Spanish texts at a level at which literary analysis can be performed;
- write and speak Spanish sufficiently to participate in critical discussions and write critical essays;
- analyze and interpret literary texts in terms of themes, characters, structure, style, and overall textual strategies;
- relate analysis and interpretations of different texts to one another; and
- communicate such interpretations competently in written form in Spanish.

The undergraduate degree in Spanish and Portuguese language and culture emphasizes knowledge and awareness of the same topics listed in the degree in Spanish Language and Literature, but specifies electives and related field courses, focusing on the Luso-Brazilian culture and adding knowledge of the Portuguese language.

The undergraduate degree in international Spanish for the professions emphasizes knowledge and awareness of:

- modern business practices as applied to the Spanish-speaking world;
- the theories of economics, business law, and international trade and finance;
- fundamental business Spanish terminology;
- the cultural environment in which business is conducted in the Spanish-speaking world;
- basic business according to the canons of this discipline; and
- international relationships.

In addition, students completing the degree in international Spanish for the professions are expected to acquire the ability and skills to:

- read and interpret in cultural and business-related terms sophisticated Spanish texts concerning business transactions;
- write and speak Spanish sufficiently to communicate effectively on business-related issues, be involved in critical discussions, and write critical essays on the subject;
- analyze a particular business problem to place it in a relevant context and formulate an appropriate response; and
- adequately translate business-related documents.

## Bachelor's Degree Programs

Students must complete the required courses of the College of Arts and Sciences and the required courses listed below. All Spanish majors are encouraged to consult with their designated departmental advisor before they register each semester.

*Required Courses* *Semester Hours*

### Language and Literature Option

SPAN 3000 Advanced Spanish Language Skills, SPAN 3100 Literary Analysis in Spanish, and SPAN 3120 Advanced Spanish Grammar . . . . .	11	
Hispanic linguistics requirement. Of the total 32 credit hours required for the degree, at least 3 credit hours must be in Hispanic linguistics (SPAN 3050, 3150, 4430, or 4450).		
At least 9 credit hours in upper-division literature, culture, and/or language (may include the Hispanic linguistics requirement) . . . . .	9	
At least 12 credit hours in courses at the 4000 level or above, with at least 9 credit hours devoted to literature (3 credit hours must come from either SPAN 4150 or 4160, and 3 credit hours must come from either SPAN 4170 or 4180). (Twelve credit hours may include the Hispanic linguistics requirement). . . . .	12	
In addition to the 32 credit hours in the Department of Spanish and Portuguese, 6 credit hours in courses from outside the Spanish department in one of the following areas are required: courses listed in the Chicano Studies program; linguistics; upper-division courses in another foreign language or comparative literature; or Portuguese 2110 and 2120 or 2150 . . . . .		6

### Spanish and Portuguese Language and Culture Option

Students must complete the required courses of the College of Arts and Sciences and the required courses listed below. All majors are encouraged to consult with their designated departmental advisor before they register each semester.

Note that prerequisites for the program include sufficient Spanish knowledge to be admitted to 3000-level courses and sufficient knowledge of Portuguese to be admitted to 2000-level courses.

PORT 2110 Second-Year Portuguese 1 or PORT 2350 Portuguese for Spanish Speakers . . . . .	3
PORT 2120 or SPAN/PORT upper-division . . . . .	3



**Upper-division**

PORT 3220 Latin American Culture: Spanish America and Brazil or PORT 3230 Lusophone Cultures: Brazil, Portugal, and Lusophone Africa . . . . 3  
 4000-level PORT course . . . . . 3  
 SPAN 3000 Advanced Spanish Language Skills, SPAN 3100 Literary Analysis in Spanish, and SPAN 3120 Advanced Spanish Grammar . . . . 11

**Hispanic Linguistic Requirement**

Of the total 32 upper-division credit hours required for the degree, at least 3 hours must be in Hispanic Linguistics (SPAN 3050, 3150, 4430, or 4440).  
 Upper-division SPAN or PORT literature, culture, and/or language (may include Hispanic Linguistics requirement).. . . . . 6  
 "Masterpieces" courses. Three of these credit hours must come from either SPAN 4150 or 4160, and 3 credit hours must come from either SPAN 4170 or 4180 . . . . . 6  
 SPAN or PORT 4000-level course . . . . . 3

*NOTE: Directly-related courses outside of the department, such as ANTH 4730, may satisfy this requirement. These courses must be preapproved by the department.*

Native speakers of Portuguese, and in general, all students whose Portuguese skills are beyond the PORT 2120 or 2150 level, are not required to take these courses. However, students have to make up these credit hours by taking 6 hours of upper-division SPAN or PORT courses or any related courses outside the department. Related courses must be approved by the department.

*NOTE: To fulfill the requirements for a Spanish Language and Literature or a Spanish and Portuguese Language and Culture major, students must complete 32 credit hours in courses at the 3000 level or above and at least 12 upper-division credits at CU-Boulder, 6 of which must be from the masterpiece courses listed previously (SPAN 4150 or 4160, and SPAN 4170 or 4180).*

No more than 3 independent study credit hours may count toward the major.

No grade lower than C- in a Spanish course will be counted in the major requirement.

Students seeking teaching certification in Spanish must take SPAN 3050, 3120, and 3200 or 3210.

Students who want certification for teaching at the secondary level should note that the School of Education requires SPAN 4650 and 4660. Students who major in Spanish are expected to meet with their departmental advisor before registration. Failure to do so may delay graduation. Students considering entering graduate school for an advanced degree in Spanish, either at CU-Boulder or any other institution, should see a departmental advisor as early as possible.

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in Spanish, students should consult with the department associate chair for undergraduate studies to obtain detailed guidelines.

**International Spanish for the Professions Option**

In cooperation with the Leeds School of Business, the department offers an interdisciplinary major in international Spanish for the professions. It offers students numerous career possibilities, both in government and private industry, at home and abroad. Those choosing this major are not able to enter the Boulder graduate program in Spanish without fulfilling the requirements in the language and literature major. Only a limited number of students may enroll in the international Spanish for the professions major. Courses within the major normally are completed in the student's junior and senior years. Declaration of the major should be completed as early as possible in the stu-

dent's academic career, but no later than the second semester of the sophomore year.

**NOTE:** Prerequisites for the program include sufficient Spanish to be admitted to 3000-level courses, ECON 2010 and 2020. SPAN 3040 and SPAN 4070 must be taken at CU-Boulder.

*Required Courses* *Semester Hours*

**Professional Spanish Courses**

(No substitutions permitted.) . . . . . 15 credit hours  
 SPAN 3030 Professional Spanish for Business 1. . . . . 3  
 SPAN 3040 Professional Spanish for Business 2. . . . . 3  
 SPAN 3200 Spanish Culture or SPAN 3210 The Cultural Heritage of Latin America or 3220 Latin American Culture: Spanish America and Brazil . . 3  
 SPAN 4060 Problems of Business Translation in Spanish 1 . . . . . 3  
 SPAN 4070 Problems of Business Translation in Spanish 2 . . . . . 3

**Spanish Language Courses** . . . . . 17 credit hours

SPAN 3000 Advanced Spanish Language Skills . . . . . 5  
 SPAN 3100 Literary Analysis in Spanish . . . . . 3  
 SPAN 3120 Advanced Spanish Grammar . . . . . 3  
 Any SPAN 4000-level course . . . . . 3  
 Upper-division elective (recommended: SPAN 3050, 3310, 3340, 4930) . . . 3

**Courses in the Leeds School of Business**

(No substitutions permitted.) . . . . . 16 credit hours  
 BCOR 2000 Accounting and Financial Analysis . . . . . 4  
 BCOR 2050/2400 Fundamentals of Marketing . . . . . 3  
 BCOR 2150/2300 Adding Value with Management . . . . . 3  
 BCOR 3000/3100 Business Law, Ethics, and Public Policy . . . . . 3  
 ECON 3403 International Economics and Policy (Prereq. ECON 1000 or ECON 2010 and 2020). . . . . 3  
 Completion of the above sequence does not fulfill all requirements for a minor in the Leeds School of Business. Majors interested in this option must consult with the Spanish department advisor and will have to take some courses for the minor during the summer.

**Area Courses** . . . . . 12 credit hours

Students are required to take courses outside the Spanish department in a field related to their professional interests or a second major or degree. These may include courses in business, economics, computer science, linguistics, another foreign language, Chicano studies, Latin American studies and international affairs, and any course dealing with the Hispanic world from anthropology, history, political science, and geography. Courses meeting this requirement must be approved by an advisor. Six credit hours may be taken in lower-division courses. Six credit hours must be taken in upper-division courses.

*NOTE: The College of Arts and Sciences does not allow more than 45 credit hours in any one discipline to be counted toward the 120 credit hours required for a BA degree. This rule does not mean that a student may not take more than 45 credit hours in Spanish, but rather that one must have at least 75 credit hours in courses other than Spanish. PORT 2110 and 2120 or 2150 will be accepted as partially fulfilling upper-division courses in other foreign languages. No Spanish or approved area courses with a grade lower than a C- will be counted in the major requirements. The ancillary GPA (made up of the combined grades from the Business courses and the Area courses) must be at least 2.00.*

**Concurrent BA/MSIB**

This program is designed for exceptional students who wish to combine their BA in international Spanish for the professions with an MS in international business (MSIB) from the University of Colorado Denver. Students are able to complete both degrees in five years, including two summer sessions, because 15 credit hours of the undergraduate major can be used to waive the common body of knowledge requirement of the MS program.

Students who wish to pursue the joint degree will need to take the following undergraduate business courses.

*Required Courses* *Semester Hours*

BCOR 2000 Accounting and Financial Analysis . . . . . 4  
 BCOR 1010/2010 Business Statistics (must be taken during summer). . . . 3

BCOR 2050/2400 Fundamentals of Marketing . . . . .	3
BCOR 3000/3100 Business Law, Ethics, and Public Policy . . . . .	3
ECON 3403 International Economics and Policy . . . . .	3

**Admission Procedures.** Students apply for the MSIB program in their third year by declaring their intention to the Spanish for the professions advisor, submitting the standard MSIB application forms, and completing admissions requirements, which include the GMAT (Graduate Management Admissions Test). Students are notified of acceptance to the program before the start of their fourth year. Students must have at least a 3.00 GPA to be considered for admission.

### Study Abroad

The department strongly recommends that all majors include some study in a Spanish-speaking country in their major program. The department co-sponsors with the University of Kansas a program in Santiago de Compostela, Spain. The university cooperates with full-year and semester programs in Argentina, Bolivia, Chile, Costa Rica, Dominican Republic, Ecuador, Mexico, Nicaragua, and Spain. There are also programs in Brazil and Portugal for Portuguese speakers. Credit earned normally counts toward satisfaction of the major requirements, but the student should see the associate chair for undergraduate studies before enrolling in a foreign program to discuss transfer of credit. Credit for work done in special programs offered by foreign universities is evaluated on an individual basis. It should be noted that courses taken abroad and designated as Spanish are also subject to the 45-hour maximum rule of the College of Arts and Sciences.

Students interested in study abroad should see International Education in the first chapter of this catalog for more information.

Students who present transfer work or credit earned in CU study abroad programs to satisfy major requirements are expected to complete at least 12 upper-division credits, including at least 6 from the 4000-level masterpiece courses listed above, on the Boulder campus. As an exception, one of the masterpiece courses can be taken in the program at Santiago de Compostela, Spain.

### Graduate Degree Programs

Students wishing to pursue graduate work in Spanish leading to candidacy for advanced degree should read carefully requirements for advanced degrees in the Graduate School section.

#### Master's Degree

**Language Requirement.** Students must demonstrate, as early as possible and before taking the comprehensive examination, a communication knowledge (as defined by the Graduate School) of a foreign language other than Spanish. They also must be able to speak, read, and write English well.

**Areas of Concentration.** The MA in Spanish is offered in two areas of concentration: one with an emphasis on literature, and one with an emphasis on linguistics. (Contact the department for further information.)

#### Doctoral Degree

**Residence Requirement.** PhD students must complete a minimum of one academic year in residence on the Boulder campus (excluding summer) within the four years immediately preceding the date on which they present themselves for the PhD comprehensive examination.

**Language Requirement.** The student must demonstrate as early as possible, but at least one full semester before taking the comprehensive examination, a communication knowledge (as defined by the Graduate School) of one foreign language and a

reading knowledge of a second language in addition to Spanish. The languages are chosen by the student in consultation with the advisory committee.

**Areas of Concentration.** The PhD in Spanish is offered in six literary periods of concentration: medieval, golden age, 18th and/or 19th century peninsular, 20th century peninsular, colonial and 19th century Spanish American, and 20th century Spanish American. For further information on these options, contact the department.

### Speech, Language, and Hearing Sciences

*Degrees*..... BA, MA, AuD, PhD

The undergraduate program in speech, language, and hearing sciences (SLHS) introduces concepts basic to human communication, and provides opportunities for students to acquire an understanding of normal and disordered speech, language, and hearing processes. The curriculum for the undergraduate degree in SLHS has been designed to fulfill the prerequisite requirements for entrance into accredited graduate programs in speech-language pathology and audiology, but also provides a strong academic foundation for students with other professional goals.

The undergraduate degree in speech, language, and hearing sciences emphasizes knowledge and awareness of:

- the anatomy of the speech and hearing mechanisms, as well as the processes of speech production, transmission, and reception;
- the development of language;
- scientific methods used in investigating speech/language/learning and hearing processes;
- the etiologies, manifestations, and treatments of speech/language/learning and hearing disorders; and
- the role of the professional speech-language pathologist and audiologist, including the history and development of the profession, the scientific traditions of the discipline, and the ethical issues in providing service to individuals with communication disorders.

In addition, students completing the degree in speech, language, and hearing sciences are expected to acquire the ability and skills to:

- express themselves effectively both orally and in written scientific and clinical discipline-specific reports;
- critically evaluate literature in the discipline; and
- analyze the acoustic output of the speech production process auditorily and/or instrumentally.

### Bachelor's Degree Program

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
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Majors must present a minimum of 35 credit hours of course work in the recommended sequence below.

#### Freshman and/or Sophomore Year

SLHS 2000 Introduction to Communication Disorders . . . . .	3
SLHS 2010 Human Communication Science . . . . .	3
LING 2000 Introduction to Linguistics . . . . .	3
LING 3100 Sound Structure of Language . . . . .	3
PSYC 1001 (as prerequisite for SLHS 4560) . . . . .	4

**Junior Year****Fall Semester**

SLHS 3106 Hearing Science . . . . .	3
SLHS 4560 Language Development . . . . .	3
SLHS 4918 Introduction to Clinical Practice . . . . .	3

**Spring Semester**

SLHS 3116 Speech Science . . . . .	3
SLHS 4918 Introduction to Clinical Practica (Only one semester of SLHS 4918 is required and may be taken in either the fall or spring.) . . . . .	2

**Senior Year****Fall Semester**

SLHS 4502 Language Disorders: Child and Adult . . . . .	3
SLHS 4704 Audiological Evaluation . . . . .	3

**Spring Semester**

SLHS 4512 Speech Disorders. . . . .	3
SLHS 4714 Audiological Rehabilitation . . . . .	3

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in speech, language and hearing sciences students should meet the following requirements:

- Declare the major by the beginning of the sophomore year
- Complete prerequisite courses—LING 2000 and PSYC 1001—by the end of spring semester of sophomore year.
- Complete the required courses in the sequence listed above.

**Graduate Degree Programs**

The graduate curriculum in speech, language, and hearing sciences leads to either a master’s or a doctoral degree. The programs in speech-language pathology and audiology are accredited by the Council on Academic Accreditation (CAA) and the Colorado State Department of Education.

Prospective students should read requirements for advanced degrees in the Graduate School section.

**Master’s Degree**

There are two areas of focus available at the MA level: 1) MA leading to professional certification in speech-language pathology by the American Speech Language Hearing Association (ASHA) and licensure for the Colorado State Department of Education and 2) research. Within departmental and ASHA guidelines, master’s students with a focus in speech-language pathology devise individualized programs of academic and clinical study that allow them to develop clinical specialties of their choosing. Clinical assignments are initiated in the department on-site Speech, Language, and Hearing Center; later, student input is obtained in making off-campus clinical assignments in educational and medical settings.

Students with an undergraduate degree in speech-language pathology and audiology can expect to complete the program in two calendar years. Those without such a background are required to make up undergraduate deficiencies, which normally require at least an additional 28 credit hours of courses in speech, language, and hearing sciences and related disciplines. Students must meet standards for both academic and clinical competence, as well as professional conduct. Full-time graduate study is required. Students not seeking clinical certification place major emphasis on speech, language, or hearing sciences under the guidance of their primary advisor and thesis research committee.

**Doctoral Degree**

There are two areas of focus available at the doctoral level: 1) AuD leading to professional certification in audiology, and 2) PhD with emphasis on research. The PhD program is grounded in research and demands demonstrated expertise beyond the academic knowledge and clinical skills required for clinical certification in speech-language pathology and/or audiology. Supervisory, administrative, instructional, and research activities are provided to acquaint students with problems and concepts at a higher level of professional activity and responsibility.

Wide latitude prevails in planning individual programs. It is expected that students have some professional experience before entering the program, and that they have specific academic or professional goals in mind. PhD candidates must take a four-course sequence in statistics and computer science and four core courses within Speech, Language, and Hearing Sciences (SLHS). Beyond that, student degree plans are individually prepared through the joint efforts of the student and an advisory committee.

The AuD program is a four-year post-baccalaureate program consisting of academic course work, clinical practicum experiences, capstone project, and advanced clinical rotations. Clinical assignments are initiated in the Boulder satellite of the University of Colorado Hospital Marion Downs Hearing Center; later student input is obtained in making off-campus clinical assignments. The program is designed so students complete all requisite clinical and academic experience for ASHA certification.

In addition, the department offers students the opportunity to pursue an integrated program of study leading to dual doctorate degrees in the field of audiology and hearing science. The PhD/AuD dual degree program trains students in clinical research and clinical practice in audiology. Students in the program gain training that will prepare them to become independent scholars, to teach in higher education, to conduct research, to become certified clinical audiologists, and to gain skills in leadership. The dual degree program allows students to pursue both their clinical training and their research training in a rigorous, intensive, and streamlined program. Students may apply to both programs simultaneously, or may apply to the PhD portion after having been accepted into the AuD portion or may apply to the AuD portion after having been accepted into the PhD portion.

**Theatre and Dance**

*Degrees in Theatre*..... BA, BFA, MA, PhD

*Degrees in Dance*..... BA, BFA, MFA

The Department of Theatre and Dance offers undergraduate and graduate degrees in both theatre and dance. These programs combine traditional studies with practical training. Ambitious seasons of theatre productions and dance concerts feature student performers and student designers, directors, and choreographers. Guest artists of national and international fame often participate in curricular and extracurricular activities. Recent guests have included Art Bridgman/Myrna Packer, Rennie Harris, Heidi Henderson, Kathleen Hermesdorf, Susan Marshall & Co., Bebe Miller, David Dorfman, Joe Goode, Kevin Wynn, and Shelley Senter in dance; Ami Dayan, Terry Berliner, Lee Blessing, Jim Moody, Tim Miller, Holly Hughes, Karen Finley, and Mark Medoff in theatre.

Students interested in theatre and dance are urged to consult with an advisor in the appropriate field to obtain both advice and the most current information concerning program opportunities and expectations.

## Bachelor's Degree Programs in Theatre

The undergraduate degrees in theatre emphasize knowledge and awareness of:

- the major works of dramatic literature that are representative of the most important eras in the development of theatre and drama in the western world;
- the history of theatrical production—its styles, conventions, and socially related mores—from the ancient Greeks to the present time;
- the various means through which a theatrical concept is realized; and
- the aesthetic and intellectual relationship between theatre in its various 20th century modes and contemporary society.

In addition, students completing a degree in theatre are expected to acquire the ability and skills to:

- analyze and interpret plays and literature with particular attention to acting and performance of literature, designing, directing, and/or playwriting and criticism;
- use, with safety and efficiency, the tools and equipment basic to theatre production technology;
- communicate to an audience through at least one of the components of theatrical art—acting, directing, designing, playwriting, or criticism; and
- function effectively as a member of a production team in the preparation of regularly scheduled public productions.

### BA Degree in Theatre

The BA degree program in theatre requires 38 credit hours in theatre, 3 in dance, and 6 in dramatic literature outside the department. It is a broadly based program of theatre practice and study for the student who may wish to pursue in-depth studies in another area as well. It also serves as the core of studies for a student who wishes to pursue further theatre training in one of the BFA areas of concentration. A grade of C- or better is needed in each required course toward the BA degree.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.

<i>Required Courses</i>	<i>Semester Hours</i>
THTR 1011 Development of Theatre 1: Classical . . . . .	3
THTR 1019 Theatre Foundations . . . . .	3
THTR 1105 Stage Technologies . . . . .	3
THTR 1115 Costume Technologies. . . . .	3
THTR 2003 Acting 1 or THTR 2043 Voice for the Stage . . . . .	3
THTR 2021 Development of Theatre 2 . . . . .	3
THTR 3035 Production Practicum . . . . .	3
THTR 3135 Tech Studio . . . . .	2
THTR 4021 Development of Theatre 4: American Theatre . . . . .	3
Electives in theatre (at least 10 upper-division) . . . . .	12
Electives in dance . . . . .	3
Electives in dramatic literature, outside the Department of Theatre and Dance, including at least 3 upper-division. . . . .	6

#### Curriculum Notes

1. Choices must be advisor approved; BFAs do not have the same options as BAs.
2. BFA Performance students must take 3 credits in Shakespeare (ENGL 3563 or 3573).
3. No more than 2 credit hours of THTR 3035 may be taken in a given semester.

Recommended sequence of courses during the initial year of theatre major program, BA and BFA:

THTR 1011 Development of Theatre 1 . . . . .	3
THTR 1019 Theatre Foundations . . . . .	3
THTR 1105 Stage Technologies . . . . .	3

THTR 1115 Costume Technologies. . . . .	3
THTR 2003 Acting 1 . . . . .	3

### Graduating in Four Years with a BA in Theatre

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in theatre, students should meet the following requirements:

- Complete THTR 1011, 1105, 1115, 1003, 2003, or 1019, and 2021 by the end of the fourth semester
- Complete 6 upper-division credit hours plus 1 credit of THTR 3035 by the end of the fifth semester
- Complete 9 additional upper-division credit hours, including all practicum/tech studio requirements by the end of the sixth semester
- Complete 6 additional upper-division credit hours, plus all 3 credits in dance by the end of the seventh semester
- Complete THTR 4021 by the end of the eighth semester

### BFA Degree in Theatre

The BFA degree program in theatre offers preprofessional training to a limited number of highly motivated and talented students aiming at professional careers. The BFA student pursues one of three possible areas of concentration: performance, theatre design, technology and management, or musical theatre.

Admission is limited not only due to student capacity, but also to ensure the type of individual attention necessary for effective training. Interested students should identify themselves as early as possible.

Formal application to the musical theatre concentration should be made concurrent with application to the university. Auditions/interviews will be held at the regular spring auditions for the College of Music. Formal application to the performance concentration should be made at the beginning of the second semester. Formal application to the design/technology/management concentrations should be made at the beginning of the third semester.

Admission is based on talent, academic record, motivation, and audition-interviews. Contact the department for information concerning auditions for these BFA tracks.

The college counts only 67 credit hours of THTR credits toward the total hours required for graduation. A grade of C- or higher is needed in each course required to fulfill the requirements of the BFA degree.

In addition to the general College of Arts and Sciences requirements for the BA degree, requirements for the BFA degree are as follows. (Courses taken as part of a student BFA concentration cannot also be counted towards fulfillment of the BA electives.)

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Concentration in Performance

61 credit hours are required in THTR, plus 9 in other disciplines. Students accepted into the performance concentration each year constitute an ensemble and as a group follow the required sequence of courses. Specific details about this sequence are available from the department. Students in this concentration must fulfill BA requirements in theatre, with specified electives, and are required to audition for major season productions each semester.

THTR 3013 Studio 1: Building a Character. . . . .	3
THTR 3023 Studio 2: Creating a Role. . . . .	3
THTR 3033 Acting Practicum (1 credit repeated twice). . . . .	2
THTR 3043 Advanced Voice for the Stage . . . . .	3
THTR 4013 Studio 3: Acting Shakespeare. . . . .	3
THTR 4023 Studio 4: Playing with Styles. . . . .	3

THTR 4033 Movement for the Actor . . . . .	3
THTR 4193 Studio 5: Creating an Ensemble . . . . .	3

### Concentration in Design, Technology, and Management

62 credit hours are required in THTR, plus 15 in other disciplines. Students in the design, technology, and management concentration must fulfill BA requirements in theatre as advised and will use the electives in the BA requirements to fulfill prerequisites for the following.

THTR 2035 Design Fundamentals . . . . .	3
THTR 4085 Theatre Management . . . . .	3
THTR 4555 Production Studio (1–2 credits repeated for a total of 6). . . . .	6
Four Advanced Technical Theatre electives (as advised) . . . . .	12

As advised, courses in other departments in drawing, painting, drafting, sculpture, and/or environmental design . . . . . 6

### Concentration in Musical Theatre

60 credit hours are required: 26 in THTR courses, 4 in DNCE courses, and 30 in the College of Music. See department website for audition information and application, [www.colorado.edu/theatredance/theatre/education.html](http://www.colorado.edu/theatredance/theatre/education.html).

#### Theatre/Dance

THTR 1019 Theatre Foundations . . . . .	3
THTR 1105 Stage Technologies . . . . .	3
THTR 1115 Costume Technologies. . . . .	3
THTR 2003 Acting 1 . . . . .	3
THTR 3011 Development of American Musical Theatre. . . . .	3
THTR 3035 Production Practicum . . . . .	3
THTR 3135 Tech Studio . . . . .	2
THTR 3053 Acting 2 or THTR 2043 Voice for the Stage . . . . .	3
THTR 4039 Musical Theatre Repertory . . . . .	3
Electives in Dance Technique . . . . .	4

#### Music

(MUSC 1081 Basic Music Theory/Aural if needed) . . . . .	(3)
MUSC 1101 Music Theory 1 . . . . .	2
MUSC 1111 Music Theory 2 . . . . .	2
MUSC 1121 Aural Skills . . . . .	1
MUSC 1131 Aural Skills . . . . .	1
MUSC 1802 Introduction to Music History . . . . .	3
PMUS 1105 Keyboard Musicianship 1 . . . . .	1
PMUS 1205 Keyboard Musicianship 2. . . . .	1
PMUS 1726 Voice . . . . .	9
PMUS 4137 Opera Theatre 1 . . . . .	1
PMUS 4147 Opera Theatre 2 . . . . .	1
PMUS 4157 Opera Practicum. . . . .	2
Non-Western Music History (2000–4000 level). . . . .	3
Western Music History (2000–4000 level). . . . .	3

### Graduating in Four Years with a BFA in Theatre

Consult the Four-Year Guarantee Requirements for information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in theatre, students should meet the following requirements:

All potential BFA students in musical theatre must declare, in writing, their intention to audition before December 1, the year before they intend to start at CU. Actual auditions and interviews for the performance and design/technology concentrations must take place by the second semester of study. Students who are accepted into a major in these BFA concentrations must declare their major immediately upon acceptance. In addition to the specific course requirements listed for completing a BFA degree in the performance and design/technology/management concentrations, students must fulfill all requirements for the BA degree in theatre. Once accepted into a BFA concentration, students should meet with a departmental advisor to confirm, in writing, specific courses to be completed within the remaining semesters of study.

As part of the first two years of study, all students who intend to enter the BFA programs in performance and design/technology must complete the following courses: THTR 1011, 1019, 1105, 1115, 2003, and one semester of 3035.

### Performance Concentration

Upon acceptance to the performance concentration, students must meet immediately with a departmental advisor. All BFA performance majors must complete the following courses in the prescribed order: THTR 3013, 3023, 3043, 4013, 4023, 4093. Students are also encouraged to complete EMUS 1184 (voice).

All students in this concentration must audition for all main stage departmental productions.

### Theatre Design, Technology, and Management Concentration

Upon acceptance to the theatre design, technology, and management concentration, students must meet immediately with a departmental advisor. Students in this concentration must take THTR 1019 Theatre Foundations as well as complete a design course in their chosen area by the end of the sophomore year.

### Musical Theatre Concentration

All potential BFA musical theatre students must declare in writing, during the application process, their intention to audition by submitting the appropriate pre-audition materials ([www.colorado.edu/TheatreDance/theatre/application2.html](http://www.colorado.edu/TheatreDance/theatre/application2.html)). Students who are accepted into the BFA musical theatre concentration must confirm their decision to enroll as TBFA MUS immediately upon acceptance following the audition. They must also meet immediately with a departmental advisor.

### Bachelor’s Degree Programs in Dance

The CU Dance Program is designed to provide a well-rounded dance education including both physical and intellectual training that instill concrete skills in performance and choreography as well as an appreciation of the role that dance plays in human culture around the world. The following areas of knowledge and experience are central to all the undergraduate degrees in dance:

- physical accomplishment at a basic level in a range of dance styles, including modern, ballet, jazz, African, and other world dance traditions, and advanced study of at least one of these styles, according to the student’s individual interests;
- experience with the process and underlying aesthetics of dance creation and composition;
- basic familiarity with cultural, sociological, and aesthetic issues important to the contemporary realities of the field of dance, including a working knowledge of major world dance styles, works of dance literature, and the history of dance;
- knowledge of the various means, such as stagecraft, costuming, makeup, and promotion, through which a public presentation of dance is realized;
- study and practical experience with the act of teaching dance, including issues of creativity, style, and pedagogical appropriateness;
- basic knowledge of tactics for prevention of injury to the dancer’s body, first aid and approaches to rehabilitation from injury, and of various somatic approaches to dance training; and
- experiential study of the relationship between dance and music, including concrete practice of skills in playing and hearing music.

In addition, students completing a degree in dance are expected to acquire the ability and skills to:

- actively participate in dance as an art form with particular attention to at least one of the following areas of dance: performance, choreography, dance production, scholarship, pedagogy, or criticism;
- understand and mobilize knowledge of appropriate use of the anatomy and physiology of the body in performance and teaching;
- communicate effectively to an audience through at least one of the components of dance—performance, choreography, teaching, or scholarship; and
- function constructively as a member of a dance community in the preparation of regularly scheduled public productions.

BA and BFA students are expected to take at least one course each in modern, ballet, jazz, and African dance technique before the end of their sophomore year. Dance majors must earn a C- or better in all required courses. Students who have not placed in the major technique class (DNCE 2021, 3041, or 4061) by their second semester in dance program are strongly advised not to continue in the major program in dance. Placement into and successful completion of major technique is a prerequisite for enrollment in other required dance courses.

**BA Degree in Dance**

Required Courses	Semester Hours
DNCE 1012 Dance Production 1	2
DNCE 1013 Improvisation	2
DNCE 1027 Introduction to Dance and Culture	3
DNCE 2501 African Dance	2
DNCE 2005 Movement Awareness and Injury Prevention for the Dancer	3
DNCE 2014 Rhythmic Analysis	2
DNCE 2021 or DNCE 3041 or DNCE 4061 Major Technique (Note 1)	6
DNCE 2033 Beginning Composition	3
DNCE 3027 Looking at Dance	3
DNCE 4015 Movement Analysis	3
DNCE 4016 Creative Dance for Children or DNCE 4036 Methods of Teaching Dance	3
DNCE 4017 History and Philosophy of Dance	3
DNCE 4939 Senior Project: Internship	2
THTR 1115 Costume Technologies	3
THTR 3035 Practicum	2
THTR 4029 Touring Ensemble	2
THTR 4081 Senior Seminar	3
Electives in dance technique courses ending in "1" (Note 1)	6
General electives in dance	2

**Curriculum Note:**

1. Students are placed at the appropriate level based on audition. Students without sufficient training will be asked to take nonmajor technique classes to make up the deficiency. These classes will not count toward the degree requirement.

**Graduating in Four Years with a BA in Dance**

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in dance, students should meet the following requirements:

- Declare the major by the beginning of the second semester.
- Complete by the end of the sophomore year: 2 credits of DNCE 2021, 3041, or 4061; 2 credits of DNCE 2501.
- Complete by the end of sophomore year: DNCE 2005, 1012, 1013, 1027, 2014, and 2033; THTR 1115, 3035, and 4029.
- Complete during junior and senior years: DNCE 4015, 4016, or 4036; DNCE 4017, DNCE 3027.

Complete during senior year: DNCE 4939, THTR 4081.  
 Complete additional 4 hours of DNCE 2021, 3041, or 4061; 6 hours of additional courses ending in “1”; and 2 hours of dance electives at appropriate time with the advice of the advisor.

**BFA Degree in Dance**

The BFA in dance is designed to meet the needs of highly talented students interested in preparing for a professional dance career while in an academic setting. The degree requires 67 credit hours in dance and 15–16 hours in theatre. Admission is limited by faculty consent to ensure the type of individual attention necessary for effective training. Students apply during the third semester while taking DNCE 2033. Students should be advised that 9 or 10 semesters are often needed to complete the BFA program. More than 120 hours may be needed for graduation.

Required Courses	Semester Hours
DNCE 1012 Dance Production 1	2
DNCE 1013 Improvisation	2
DNCE 1027 Introduction to Dance and Culture	3
DNCE 2501 African Dance	2
DNCE 2005 Movement Awareness and Injury Prevention for the Dancer	3
DNCE 2014 Rhythmic Analysis	2
DNCE 2021, 3041, or 4061 Major Technique (Note 1)	12
DNCE 2033 Beginning Composition	3
DNCE 3024 Musical Resources	2
DNCE 3027 Looking at Dance	3
DNCE 3043 Intermediate Comp.	3
DNCE 3601 Alexander Technique	2
DNCE 4012 Concert Production	1
DNCE 4015 Movement Analysis	3
DNCE 4016 Creative Dance for Children or DNCE 4036 Methods of Teaching Dance	3
DNCE 4017 History and Philosophy of Dance	3
DNCE 4053 Advanced Composition	3
DNCE 5052 Studio Concert	3
THTR 1003 or 2003 Acting or DNCE 4018 Performance Improvisation Techniques	2-3
THTR 1115 Costume Technologies	3
THTR 3035 Practicum	1
THTR 4029 Touring Ensemble	total 6
THTR 4081 Senior Seminar	3
Electives in dance technique courses ending in "1" (Note 1)	9
Electives in dance	3

**Curriculum Note:**

1. Students are placed at the appropriate level based on audition. Students without sufficient training will be asked to take nonmajor technique classes to make up the deficiency. These classes will not count toward the degree requirement.

**Graduating in Four Years with a BFA in Dance**

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BFA in dance, students should meet the following requirements:

- Acceptance into the BFA by the end of the third semester with consent of dance faculty.
- Complete by the end of the sophomore year: 4 credits of DNCE 2021, 3041 or 4061; 2 credits of DNCE 2501.
- Complete by the end of the sophomore year: DNCE 1012, 1013, 1027, 2005, 2014, 2033; THTR 1115, 3035 and 2 credits of THTR 4029.
- Complete during junior and senior years: DNCE 3024, 3027, 3043, 4012, 4015, 4016 or 4036, 4053; 4 credits of THTR 4029.
- Complete during senior year: DNCE 5052, THTR 4081.

Complete at appropriate time with advice from advisor: 8 additional credits of DNCE 2021, 3041, or 4061; 9 hours of dance technique courses ending in "1"; 3 credits of dance electives; DNCE 3601; THTR 1003 or 2003 or DNCE 4018.

### Minor Programs

The dance minor is a 20-credit program open to any student enrolled at CU, regardless of college or school. For more information see [www.colorado.edu/artssciences/students/undergraduate/academics/minors.html](http://www.colorado.edu/artssciences/students/undergraduate/academics/minors.html).

### Graduate Degree Programs

The MA and PhD degrees are offered in theatre. The MFA degree is offered in dance. A joint MA/MBA degree is offered in theatre with the CU Leeds School of Business.

### Departmental Requirements

Students wishing to pursue graduate work in theatre or in dance should carefully read both requirements for advanced degrees in the Graduate School chapter of this catalog and the following departmental requirements. Students should note that departmental requirements are sometimes more comprehensive than those minimums established by the Graduate School.

**Prerequisites.** Applicants are admitted to the graduate program in theatre and in dance on the basis of their academic records and recommendations. Students admitted who are unable to offer a substantial number of credit hours of work in the area of their intended specialization or allied fields must expect that a significant number of additional courses and credit hours are required of them in order to make up deficiencies.

Applicants for the MFA program in dance must audition in person; international students may audition by video tape. Applicants are expected to show a high level of proficiency in dance performance and choreography. Contact the dance office for specific audition dates; auditions are usually held in February or March for admission the following fall. The deadline for applications from U.S. citizens is December 15; from non-U.S. citizens, it is December 1. Applicants who want to apply for graduate part-time instructor (GPTI) positions must apply by December 1.

**Diagnostic Meeting.** Every student will have a meeting with faculty upon entering the program. Topics discussed in the meeting and other available information are employed to design the best possible course of study for the student. This evaluation may indicate course work as necessary above and beyond the required hours for the degree.

**Advisor and Graduate Committee.** For every student who declares an intention to work toward an advanced degree, an advisor and committee are designated so that a degree plan may be designed before the end of the first semester of residence.

All candidates for a degree have the responsibility of making certain that the appropriate persons or committees have been appointed to supervise the various steps in their graduate programs. Detailed instructions are available from the department.

### MA Degree in Theatre

**Course Requirements.** All master's degree students in theatre are required to complete THTR 5011, 6009, and two of the following: THTR 6011, 6021, 6031, or 6041. Students can choose either a thesis or nonthesis track program.

After any undergraduate deficiencies have been removed, students must earn 30 semester hours, at least 16 of which must be in THTR courses at the 5000 level or above. Four to six thesis

credit hours may be counted toward the 30-hour requirement. At least 24 of the 30 hours must be at the 5000-level or above.

### Master of Business Administration/Master of Arts, Theatre, and Dance

The Leeds School of Business, in conjunction with the Department of Theatre and Dance, offers students the ability to earn an MBA and an MA in theatre or dance through a three-year dual-degree program. Students in the MBA/MA dual-degree program pursue careers in a wide variety of fields and jobs in the world of the performing arts. Types of organizations include theatre companies, dance companies, opera companies, symphonies, arts councils, performing arts complexes, civic auditoriums, and arts presenters.

**Admission.** An individual must apply separately and be admitted to both programs under each school's or college's admission procedures and standards. Applicants are encouraged to apply to the two programs concurrently.

**Course of Study.** Students in the MBA/MA in theatre and dance spend the first year of their dual-degree program exclusively in either the business school or the theatre/dance program. In the second year, courses are taken exclusively in the other department. The third year offers students the opportunity to take both MBA and theatre/dance elective courses.

**Credit for Courses.** Dual-degree students are required to complete 43 hours of MBA course work and 24 hours of theatre/dance course work. A minimum of 67 approved credits must be completed to earn both degrees.

### PhD Degree in Theatre

Doctoral students in theatre are normally expected to earn 30 credit hours of course work beyond the master's degree at the 5000-level or above. When approved by the student advisory committee, credits from other departments on campus may count, provided the course is taught by a member of the graduate faculty in that department.

Doctoral study in theatre is based on the following core of required advanced courses.

THTR 5011 Theory and Criticism

THTR 6009 Research Strategies and Techniques

Plus three of the following:

THTR 6011 On-Stage Studies: Classical and Neoclassical Drama

THTR 6021 On-Stage Studies: Elizabethan and Jacobean Drama

THTR 6031 On-Stage Studies: American Theatre and Drama

THTR 6041 On-Stage Studies: Modern European Drama

Beyond the core courses, studies are determined by students and their advisors, consistent with Graduate School and departmental requirements. Doctoral students are required to demonstrate proficiency in a foreign language equivalent to the completion of a second-semester college level before taking the comprehensive exam. In addition to the 30 hours of course work, 30 dissertation credits (THTR 8999) are required.

### MFA Degree in Dance

**Course Requirements.** The three-year program requires a minimum of 60 credit hours, at least 30 of which must be taken in dance at the 5000 level or above. The program focuses on performance/choreography and secondary areas of specialization. At least 6 credit hours must be taken outside of dance in an approved allied field. The program is designed to accommodate recent BA or BFA graduates and practicing professionals desiring a graduate degree who have a bachelor's degree.

The MFA in dance is based on a required core of courses including modern dance, ballet, African dance, Alexander technique, choreography, history, readings in dance, seminars in dance and music, research strategies, pedagogy, and a creative project or thesis. Contact the department for detailed information.

**Project or Thesis.** In the second year of the degree program, a written proposal for a creative project or thesis must be presented and approved. Upon its completion, an oral defense of the project or thesis is required.

**Graduate Comprehensive Essay Portfolio.** Three well defined essays are submitted during the final semester that demonstrate knowledge of scholarly sources and articulation of personal philosophy.

## Western American Studies

The Center of the American West offers an undergraduate certificate program in Western American Studies for students who have an intellectual commitment to any of a broad range of issues and aspects of the American West, including history and literature, culture and society, and economic and environmental challenges facing western communities. Courses involve students in an exploration of the past, an appreciation for traditional and contemporary stories and art in the region, and an understanding of western landscapes, ecosystems, and the factors that affect them.

The certificate program is interdisciplinary, drawing on courses and expertise from over a dozen departments spanning the humanities, natural sciences, and social sciences. Course work may be taken concurrently with undergraduate studies. Students complete 24 credit hours of C or better course work, of which a minimum of 15 are upper division and a minimum of 12 are from outside the student's major. Contact the Center of the American West at 303-735-1399 or visit [www.centerwest.org/academics/certificate](http://www.centerwest.org/academics/certificate) for program details.

## Western Civilization Studies

The Center for Western Civilization (CWC) offers an undergraduate certificate program, Foundations of Western Civilization, for students interested in a rigorous grounding in Western culture. The certificate promotes critical reflection and academic research on the traditions and issues that characterize Western civilization through the study of Western culture, science, and government in their ancient, medieval, and modern forms, with special emphasis on the Classical Tradition and the American Founding. It helps students understand their role as citizens in a nation founded on the ancient ideals of consensual rule and republican government.

The curriculum is interdisciplinary with over 30 courses taught by faculty in departments that include classics, English, history, philosophy, religious studies, and Germanic languages and literatures. The certificate requires the completion with a grade of C- or better of eight courses (24 credit hours), of which 15 credit hours must be at the upper-division level. Up to three courses (or nine credit hours) may come from the student's major. In addition, students must fulfill the requirements for a BA in their major in a school or college at the University of Colorado. For more information on the program, requirements, and current course offerings, contact CWC Assistant Director Vincent McGuire at 303-735-3019 or [Vincent.McGuire@colorado.edu](mailto:Vincent.McGuire@colorado.edu).

## Women and Gender Studies

*Degree* ..... BA

Students may earn a bachelor of arts degree in women's studies or a women's studies minor to supplement study in their major field.

Since 1974, the Women and Gender Studies Program has offered an interdisciplinary curriculum encompassing social sciences and humanities. Courses reflect the new scholarship on women: they focus on the interface of the public and private spheres of women's lives; on the intersection of gender, race, ethnicity, sexuality, nation and class; feminist theory; gender identity and theories of inequality. The curriculum is multifaceted, offering courses on women of color, women and development, global feminism, feminist research methods, and gender and sexuality. The program houses a reading library and organizes colloquia, workshops, and other cultural and educational events.

A women's studies major is useful in pursuing careers in law, medicine, government, public health, public policy, social work, teaching, counseling, advocacy, journalism, television production, labor and nonprofit organizing, public relations, education, politics, fundraising, small business development, librarianship, arts administration, and the Foreign Service.

The undergraduate degree in women's studies emphasizes knowledge and awareness of:

- the historical and cross-cultural variability of social norms of masculinity and femininity;
- the ways in which ideas of masculinity and femininity shape and interact with class, race, ethnicity, sexuality, ability, and nationality;
- the centrality of gender at the local, national, and international levels of society, politics, and the economy;
- the diversity of global feminism;
- how women interact with the global economy;
- how power and privilege function in relation to the intersections of gender, race, class, sexuality, and nationality;
- women's participation in, contribution to, and transformation of areas of social life including culture, society, politics, the economy, and religion;
- discrimination and violence against women;
- women's activism and resistance;
- the varied research methods and theoretical perspectives used in women, gender, and sexuality studies scholarship, including the relationship between theory and practice; and
- the history of women and gender studies as an academic discipline and the main themes that have characterized its emergence.

In addition, students completing the program in women's studies are expected to acquire the ability and skills to:

- express ideas clearly in spoken form;
- employ creative problem-solving techniques;
- organize and synthesize material in new ways;
- analyze texts and information critically;
- articulate clearly complex ideas in written form; and
- participate in teamwork successfully.

Students must complete the general requirements of the College of Arts and Sciences and the required courses listed below.



<i>Required Courses</i>	<i>Semester Hours</i>
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Students must complete a minimum of 36 credit hours with grades of C- or better in women and gender studies courses, a minimum of 24 credits of which must be upper division (3000 or 4000 level).

**Required Courses (15 hours)**

WMST 2000 Introduction to Feminist Studies . . . . .	3
WMST 2600 Gender, Race, and Class in Global Context . . . . .	3
WMST 3020 Methods of Inquiry in Gender, Race, Class, and Sexuality. . . . .	3
WMST 3100 Feminist Theories . . . . .	3
WMST 4800 Senior Colloquium in Feminist Studies . . . . .	3

**Lower-division Elective Courses**

(no more than 6 additional credit hours at the 1000–2000 levels)

Students may choose from any of the lower-division courses listed below, or courses approved by the advisor and the WMST department, that are not applied to courses listed either above or below.

ENGL 1260 Into to Women's Literature . . . . .	3
SOCY 1006 Social Construction of Sexuality OR SOCY 1016 Sex, Gender, Society . . . . .	3
WMST 2200 Women, Literature, and the Arts . . . . .	3
WMST 2400 Women of Color and Activism . . . . .	3
WMST 2020 Social Construction and Femininities and Masculinities . . . . .	3
WMST 2050 Gender and Contemporary Culture . . . . .	3
WMST 2700 Psychology and Contemporary Women . . . . .	3

**Upper-division Courses**

(at least 15 credit hours; total credits hours must come to 36)

Students must take at least one course each in the following categories: gender/sexuality; race/ethnicity; global/transnational. For the remaining 6 credits, students may take additional courses from these three categories and/or the upper-division electives list. Consult the WMST advisor or the department for additional choices.

**Gender/Sexuality**

LGBT 3796 Queer Theory . . . . .	3
PSCI 3301/WMST 3300 Gender, Sexuality, and U.S. Law . . . . .	3
SOCY 3046/WMST 3046 Topics in Sex and Gender . . . . .	3
SOCY 4016/WMST 4016 Sex, Gender, and Society 2. . . . .	3
WMST 4287 Studies in Lesbian, Gay, Bisexual, and Transgender Literature . . . . .	3
WMST 4636 Lesbian and Gay History . . . . .	3

**Race/Ethnicity**

ETHN 3026 Women of Color: Chicanas in U.S. Society . . . . .	3
ETHN 3213/WMST 3210 American Indian Women. . . . .	3
WMST 3044 Race, Class, Gender, and Crime. . . . .	3
WMST 3135 Chicana Feminism and Knowledge . . . . .	3
WMST 3505 Historical and Contemporary Issues of Black Women . . . . .	3
WMST 3600 Latinas: History, Culture, and Social Activism. . . . .	3
WMST 3900 Asian American Women . . . . .	3
WMST 4619 Women in Asian History . . . . .	3

**Global/Transnational**

ANTH 3180 Gender, Culture, and Sexuality . . . . .	3
WMST 3220 Women and Islam. . . . .	3
WMST 3500 Global and Gender Issues . . . . .	3
WMST 3650 Women and Politics in Latin America . . . . .	3
WMST 3670 Immigrant Women in the Global Economy . . . . .	3
WMST 3672 Gender and Global Economy . . . . .	3
WMST 3730 Third World Women and the Politics of International Development. . . . .	3
WMST 4300 Sex, Power, Politics: International Perspectives . . . . .	3

**Upper-division Electives**

ARTH 3209 Culture and Gender Diversity . . . . .	3
ENGL 3217 Topics in Gender Studies . . . . .	3
FILM 3013 Women and Film. . . . .	3
HIST 3016 Seminar in the History of Gender and Science . . . . .	3
HUMN 3065 Feminist Theory/Women's Art. . . . .	3
ITAL 4730 Italian Feminism, Culture, Theory, and Narratives of Disclosure . . . . .	3

THTR 4041 Women and Theatre/20th Century . . . . .	3
THTR 4073 Performing Voices of Women . . . . .	3
WMST 3000 Gender, Work, and Public Policy . . . . .	3
WMST 3016 Marriage and Family in U.S. Society . . . . .	3
WMST 3090 Critical Thinking in Feminist Studies . . . . .	3
WMST 3110 Feminist Practical Ethics. . . . .	3
WMST 3200 Religion and Feminist Thought . . . . .	3
WMST 3267 Women Writers . . . . .	3
WMST 3302 Peaceful Community Change . . . . .	3
WMST 3314 Violence against Women and Girls . . . . .	3
WMST 3601 German Women Writers . . . . .	3
WMST 3656 History of Women in Progressive Social Movements . . . . .	3
WMST 4000 Senior Seminar: Special Topics. . . . .	3
WMST 4016 Sex, Gender, and Society 2 . . . . .	3
WMST 4063 Women in Victorian England . . . . .	3
WMST 4086 Family and Society . . . . .	3
WMST 4277 Topics in Women Literature. . . . .	3
WMST 4331 Women in Popular Culture. . . . .	3
WMST 4471 Russian Women in 20th Century Russian Culture. . . . .	3
WMST 4614 Women and Society in Industrial Europe . . . . .	3
WMST 4616 History of Women in the U.S. to 1890 . . . . .	3
WMST 4626 History of Women since 1890 . . . . .	3

**Honors**

Students may take up to 6 credits of honors hours in WMST; credits apply to upper-division electives in the major.

WMST 4950 Honors Research . . . . .	1-6
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**Internship**

Students may take up to 6 credits of internship hours in WMST; credits apply to upper-division electives in the major.

WMST 3930 Women's Studies Internship . . . . .	1-6
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**Special Topics**

Students may take up to 6 credit hours in WMST topics courses; course topics vary each semester. Ask the WMST advisor or department about how each course applies to major cognates.

WMST 3700 Contemporary Topics in Women, Gender, and Sexuality Studies . . . . .	3
WMST 3710 Topics in Global Gender Studies . . . . .	3
WMST 4000 Senior Seminar: Special Topics. . . . .	3

**Graduating in Four Years**

Consult the Four-Year Guarantee Requirements for more information on eligibility. The concept of “adequate progress” as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress in women and gender studies, students should meet the following requirements:

- Declare major by the beginning of the second semester.
- Complete WMST 2000 and 12 additional credit hours of major requirements by the end of the fourth semester.
- Complete WMST 3100 and 27 total credit hours of major requirements by the end of the sixth semester.
- Complete WMST 4800 and one additional 3-credit course of the major requirements by the end of the eighth semester.

**Minor Programs**

A minor program in women's studies is offered. Declaration of a minor is open to any student enrolled at CU-Boulder, regardless of college or school. Current requirements are being updated by the program. Contact the Department of Women and Gender Studies for more information.

## Writing and Rhetoric, Program for

The Program for Writing and Rhetoric (PWR) is a free-standing unit in the College of Arts and Sciences responsible for campus-wide instruction in expository writing. The program coordinates and oversees all writing curricula and instruction intended to meet college and campus requirements, including efforts in specific disciplines and targeted campus programs.

The program is committed to training students to think critically about the texts they read and the writing they produce, and to enable them to shape and express ideas with clarity and grace in any context: academic, professional, or civic. Classes are generally conducted as intensive writing workshops, placing a premium on thoughtful, substantive revision.

The program offers both lower-division and upper-division courses, as well as some graduate seminars. Certain undergraduate courses fulfill the College of Arts and Sciences written communication requirement, and some also fulfill graduation requirements in other colleges. Students should check with their advisors to be sure that they are taking the right course to fulfill their requirement.

For information about specific classes and their instructors, students should visit [www.colorado.edu/pwr](http://www.colorado.edu/pwr).

### Faculty— College of Arts and Sciences

#### Anthropology

DENNIS B. MCGILVRAY, department chair; associate professor. BA, Reed College; MA, PhD, University of Chicago.

DOUGLAS B. BAMFORTH, professor. BA, University of Pennsylvania; MA, PhD, University of California, Santa Barbara.

DAVID A. BRETERNITZ, professor emeritus.

CATHERINE M. CAMERON, associate professor. BA, University of California, Berkeley; MA, University of New Mexico; PhD, University of Arizona.

LINDA S. CORDELL, professor emerita.

HERBERT H. COVERT, professor. BA, University of Massachusetts; MA, Arizona State University; PhD, Duke University.

DARNA L. DUFOUR, associate dean for faculty and administrative affairs, College of Arts and Sciences; professor. BS, Northeastern University; MA, PhD, State University of New York, Binghamton.

FRANK W. EDDY, associate professor emeritus.

DONNA M. GOLDSTEIN, associate professor. BS, Cornell University; EdM, Harvard Graduate School of Education; PhD, University of California, Berkeley.

GERARDO GUTIÉRREZ, assistant professor. BA, The National School of Anthropology and History, Mexico; MA, El Colegio de México, Mexico; PhD, Pennsylvania State University.

DAVID LEE GREENE, professor emeritus.

KIRA HALL, associate professor of linguistics; associate professor attendant rank. BA, Auburn University; MA, PhD, University of California, Berkeley.

JAMES J. HESTER, professor emeritus.

CARLA JONES, assistant professor. BA, MA, University of California, Berkeley; PhD, University of North Carolina at Chapel Hill.

ARTHUR A. JOYCE, associate professor. BA, University of Delaware; MA, PhD, Rutgers University.

DOROTHEA V. KASCHUBE, professor emerita.

ALEC J. KELSO, professor emeritus.

GOTTFRIED O. LANG, professor emeritus.

STEVEN H. LEKSON, professor; curator of museum studies. BA, Case Western Reserve University; MA, Eastern New Mexico University; PhD, University of New Mexico.

JAMES E. LOUDON, instructor. BS, Central Washington University; MA, University of Calgary; PhD, University of Colorado at Boulder.

J. TERRENCE McCABE, professor. BA, University of Notre Dame; MA, PhD, State University of New York at Binghamton.

JAMES RUSSELL McGOODWIN, professor. BBA, MBA, PhD, University of Texas at Austin.

CAROLE M. McGRANAHAN, assistant professor. BA, Colgate University; MA, PhD, University of Michigan.

RICHARD Y. NISHIKAWA, assistant dean for curricular affairs, College of Arts and Sciences; assistant professor attendant rank. AB, University of California, Santa Cruz; PhD, University of Washington.

L. KAIFA ROLAND, assistant professor. BA, Oberlin College; MA, Howard University; PhD, Duke University.

MICHELLE L. SAUTHER, associate professor. BA, Montana State University; MA, Arizona State University; PhD, Washington University.

JENNIFER SHANNON, assistant professor. BA, Bowdoin College; MA, University of Chicago; PhD, Cornell University.

PAUL SHANKMAN, professor. BA, University of California, Santa Barbara; PhD, Harvard University.

PAYSON D. SHEETS, professor of distinction. BA, MA, University of Colorado; PhD, University of Pennsylvania.

MATT SPONHEIMER, associate professor. BA, Bucknell University; MA, PhD, Rutgers University.

DENNIS P. VAN GERVEN, professor. BA, University of Utah; MA, PhD, University of Massachusetts Amherst.

DEWARD E. WALKER JR., professor (joint with the Department of Ethnic Studies). BA, PhD, University of Oregon.

#### Applied Mathematics

JAMES H. CURRY, department chair; professor. BA, MA, PhD, University of California, Berkeley.

MARK J. ABLOWITZ, distinguished professor. BS, University of Rochester; PhD, Massachusetts Institute of Technology.

JEROLD BEBERNES, professor emeritus.

GREGORY BEYLKIN, professor. BS, MS, University of Leningrad; PhD, Courant Institute of Mathematical Sciences, New York University.

Y. SUJEET BHAT, instructor. BS, PhD, University of Florida; MS, University of Texas at Dallas.

DAVID BORTZ, assistant professor. BA, Rice University; MS, PhD, North Carolina State University.

JEM CORCORAN, associate professor. BS, Colorado State University; MS, Purdue University; PhD, Colorado State University.

CHRISTOPHER W. CURTIS, instructor. BS, Illinois Institute of Technology; PhD, University of Washington.

ANNE DOUGHERTY, associate chair; senior instructor. BS, Texas Christian University; MS, Oregon State University; PhD, University of Wisconsin.

ROBERT EASTON, professor emeritus.

BENGT FORNBERG, professor. BS, PhD, Uppsala University.

KEITH JULIEN, associate professor. BS, Kings College, University of London; PhD, Churchill College, Cambridge University.

CONGMING LI, professor. BS, University of Science and Technology of China; MS, Institute of System Sciences; PhD, Courant Institute of Mathematical Science, New York University.

MANUEL E. LLADSER, assistant professor. BS, Universidad de Chile; MS, University of Wisconsin; PhD, Ohio State University.

THOMAS MANTEUFFEL, professor. BS, University of Wisconsin; MS, PhD, University of Illinois.

PER-GUNNAR MARTINSSON, assistant professor. Diploma and Licentiate degree, Chalmers University of Technology in Gothenburg; PhD, University of Texas at Austin.

STEVEN McCORMICK, professor. BA, San Diego State College; PhD, University of Southern California.

JAMES D. MEISS, graduate chair; professor. BS, University of Washington; MA, PhD, University of California, Berkeley.

MARY NELSON, instructor. BS, Marquette University; MS, George Mason University; PhD, University of Colorado.

# Leeds School of Business

*Manuel Laguna, interim dean*

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school website: [leeds.colorado.edu](http://leeds.colorado.edu)



**T**HE LEEDS SCHOOL OF BUSINESS develops people who are knowledgeable in best business practices, can think critically and creatively, communicate effectively, adapt to and lead change, act ethically, value diversity, and are competitive in the global economy. The school promotes academic excellence, fosters strong relationships with the surrounding business community, and emphasizes ongoing business research.

The Leeds School of Business holds accreditation from AACSB-International. The school awards four degrees: the bachelor of science in business administration (BS), the master of science in business administration (MS), the master of business administration (MBA), and the doctor of philosophy in business administration (PhD).

Strong historical ties to the business community enable the school to provide students with the most practical educational experience during their academic careers. The board is composed of high-level executives who provide advice, counsel, and an outside perspective to the dean and his administration while advocating for the school within the external community. Board members spearhead major parts of development programs, strengthen the school's nationwide network in business and political arenas, and provide significant input to curriculum design.

Each year, nationally recognized business executives visit the school to share their working-world experience, their expertise, and often their reflections on life outside of business. Visiting executives are present in classroom settings, informal luncheons, and after-hours meetings, and often hold office hours to meet with students individually. Students enjoy conversations with these professionals, which cover a range of subjects including: the types of courses students are taking, career planning, steps to success, their own successes and failures, and corporate and personal strategies.

The faculty of the school is made up of talented men and women who offer a diverse range of expertise and research activities. The faculty publishes frequently and is internationally recognized for the quality of its research. In addition, many maintain strong ties within the business community and bring a current business perspective to the classroom. Business faculty members strive to deliver the most effective teaching in management theory and real-world applications to ensure a quality learning experience for business graduates.

## Facilities and Research Activities

The Leeds School of Business houses several resources for the specific needs of business students. The facilities include: the William M. White Business Library and Information Commons, smart classrooms, the MBA Business Center, a student lounge, food center, faculty and administrative offices, the Business

Research Division, the Robert H. and Beverly A. Deming Center for Entrepreneurship, the Real Estate Center, the Burrigge Center for Securities Analysis and Valuation, and the Center for Business and Society.

The William M. White Business Library ([ucblibraries.colorado.edu/business](http://ucblibraries.colorado.edu/business)) and Information Commons provides students with a wealth of information pertaining to the business world. Students have access to the business and other libraries via the university libraries online catalog. Many databases are accessible through the wireless network and off campus. These databases, both CD- and web-based, contain a myriad of full-text magazines and journals; business periodical indexes; corporate annual, 10-K, and proxy reports of all the public companies in the United States; short profiles of both American and international companies; demographic and business statistics; industry and market information; and investment reports written by Wall Street analysts. Over 50 computers provide access to the databases and the Internet, and technology-outfitted team rooms are available for group study. Knowledgeable librarians are always available to help navigate the search for information. The Information Commons is open 24 hours, seven day per week and contains 30 of the 50 computers with a full suite of software. These are accessible to students, faculty, and staff of the university. In addition, Leeds has 25 technology equipped team rooms. These rooms support group study and project work. They are available for reservation at [leeds.colorado.edu/teamroom](http://leeds.colorado.edu/teamroom).

The White Business Library is part of the University of Colorado library system, which includes more than two million volumes, more than five million microforms, and more than 24,000 periodicals and serials. The system is also a full depository for United States government, international, and state documents.

All classrooms in the Leeds School of Business are electronic and equipped with computers; Microsoft Office applications including Excel, PowerPoint, Word, and Access; projection systems; and multimedia capabilities including video, cable, and Internet connections.

## Business Research Division

Established in 1915, the Business Research Division is one of the earliest organized state service-oriented bureaus in the country.

The Business Research Division conducts business, economic, and market research that contributes to the efficient use of Colorado's resources and increases interest in and awareness of the Leeds School of Business. It also is the umbrella organization for the Rocky Mountain Trade Adjustment Assistance Center (RMTAAC) and the Colorado Association of Manufacturing and Technology (CAMT). Through its annual Colorado Business Economic Outlook Forum, held in December, the division has established a base of knowledge that adds value to its work in other areas. In addition to providing companies and state

agencies with information to help them make better-informed business and policy decisions, the division conducts research in a variety of areas, including government policy, technology, and real estate. It also prepares a Colorado leading economic indicator series, The Leeds Business Confidence Index, and collects local economic data for various city and county organizations. Research results are distributed through presentations and reports; a quarterly newsletter, the *Colorado Business Review*; and the division's website.

Funding for center activities comes from the Leeds School of Business, the university, state agencies, the federal government, state and local business firms, and from the sale of research products and services.

The centers provide a variety of services, including contract research and support for faculty research, both theoretical and applied. In addition, the centers provide outreach and community service activities and consulting support to small and medium-sized businesses in Colorado.

RMTAAC is one of 12 centers across the nation funded by the Department of Commerce to assist U.S. manufacturers that have been hurt by foreign competition. The assistance is provided on a cost-share basis where RMTAAC typically pays more than 50 percent of the cost.

The purpose of the Trade Adjustment Assistance program is to retain and create U.S. manufacturing jobs. From its location in Boulder, RMTAAC assists manufacturers in the Rocky Mountain region. A typical client has \$10 million in annual sales and 100 employees.

Once a firm has been certified as eligible for assistance, a strategic business plan is developed to improve the firm's competitiveness. Necessary technical expertise is then brought in to implement the recommendations in the plan. Assistance, which normally takes two to three years, can be provided in all the functional areas.

CAMT is a not-for-profit organization designed to help manufacturers improve quality, productivity, and marketing while reducing costs. CAMT's mission is to provide business solutions that give manufacturers a competitive edge. Partial funding is provided by the NIST Manufacturing Extension Partnership and state resources, and some services are available at no cost. Assistance includes hands-on consulting, project management, seminars, industry roundtables, and equipment demonstrations. CAMT professionals have expertise in business and engineering, and also provide access to a network of service providers.

## Academic Centers

In addition to the Business Research Division, the school has five centers linking academic programs and the business community—the endowed Robert H. and Beverly A. Deming Center for Entrepreneurship, the Center for Real Estate, the Burridge Center for Securities and Valuation, the Curriculum Emphasis on Social Responsibility (CESR), and the Center for Business Integration.

### *The Robert H. and Beverly A. Deming Center for Entrepreneurship*

The Deming Center for Entrepreneurship starts with a rich academic program led by thought leaders in entrepreneurship. The program is designed to help students develop the intellectual framework necessary for successful entrepreneurial decision making. The in-class experience is enhanced by a beyond-the-classroom experience that provides relevant, hands-on learning.

At the Deming Center, students have an opportunity to be among the pioneers exploring the future of entrepreneurship—sustainable venturing. More than just “greentech” or “cleantech,” sustainable venturing is about harnessing the knowledge, power, and passion of entrepreneurs to create a new generation of businesses that strengthen rather than deplete the environmental and economic resources of our planet.

Through Deming Center activities and the entrepreneurship curriculum, students get a head start, building a strong foundation in accounting, finance, management, marketing, operations, and systems. They study each of these subjects in the context of entrepreneurial decision making. Some of those activities include:

**Cleantech Venture Challenge (CVC)**—An annual international business plan competition that draws international graduate teams and is designed to be the premier student competition showcasing emerging opportunities in the cleantech sector.

**Sustainable Opportunities Summit (SOS)**—An annual summit that brings a diverse group of leaders from major corporations, emerging and entrepreneurial companies, and investment firms to share strategies companies can adopt to take advantage of this growing field. The summit features sustainable enterprise success stories in a wide range of industries including clean energy, organic food, computer manufacturing, green building, banking, and venture capital.

**RASEI-Renewable and Sustainable Energy Institute**—A critical aspect of the Renewable and Sustainable Energy Institute (RASEI) is commercialization: moving new technologies into clean and renewable energy markets as rapidly as possible. The Energy Institute's business program facilitates increased commercialization through start-up incubation, research and deployment collaborations, early student engagement, strategic giving opportunities, and increased networking between the CU community and the business community at large. RASEI has partnered with the Deming Center, Tech Transfer Office, and other institutions on and off campus to create a hub for cleantech commercialization and start-ups.

**CIMB, Colorado Initiative in Molecular Biotechnology**—The Deming Center and the Leeds School are currently assessing opportunities to partner with the new Colorado Initiative in Molecular Biotechnology, CU's Biotech Initiative. Led by Nobel Laureate Tom Cech and Leslie Leinwand, the Biotech Initiative will focus on key research priorities, as well as seeking to address the gap in education between “the bench and the bedside.” Traditionally, the gap has been the business skills and expertise that help bring transformational scientific research and medical breakthroughs through the process of regulatory approval and commercialization

**TREP Café**—This student run and managed specialty coffee and food service is sponsored by the Deming Center and is run and managed by undergraduates.

Continued national recognitions affirm the quality of the Deming Center for Entrepreneurship's program and its success creating innovative new areas of entrepreneurial opportunity. The undergraduate and graduate program has been ranked among the top 20 nationally in *U.S. News and World Report's* rankings in Business Specialties Entrepreneurship for the last 10 years.

The center's work in sustainable venturing, natural and organic products, and renewable energy keep it at the forefront of entrepreneurship education. Collaborations across campus, in the business community, and with national government labs have established a model for the intersection of entrepreneurial creativity, technology, and innovation.

Successful collaborations include CU-Boulder's Technology Transfer Office, Renewable Energy Initiative, Entrepreneurial Law Clinic, Music Entrepreneurship Program, Silicon Flatirons Telecommunications Program, and College of Engineering & Applied Science. Partnerships with entrepreneurial incubators, innovation centers, and government agencies include: CTEK Venture Centers, Boulder Innovation Center, Naturally Boulder Products Task Force, the National Renewable Energy Laboratory (NREL), and the National Center for Atmospheric Research (NCAR).

The center's internal business plan competitions and existing programs continue to grow and thrive. Included among those are the undergraduate Certificate of Excellence in Entrepreneurial Studies, the Collegiate Entrepreneurs Organization, the annual Evening with Entrepreneurs event, and the TREP Café. At the MBA level, the Graduate Entrepreneurs Association supports activities to encourage and promote student activity in entrepreneurship including Learn from the Best and the annual Entrepreneurship Retreat. MBAs also continue the legacy of Entrepreneurial Solutions, a for-profit, student-run consulting firm staffed by a select group of MBA students. It serves the business community by providing high value solutions that rely on the expertise of each year's team.

### *Real Estate Center*

The Real Estate Center, founded in 1995, is supported by an industry council with the goal of advancing academic excellence in real estate education and scholarship. The center oversees the school's real estate teaching programs and advises the faculty in designing an integrated curriculum at both the graduate and undergraduate levels. Course work is drawn from the law school, the colleges of architecture and engineering, construction management, and others.

The center creates real-world experiences for students by providing project course work and being a resource for securing internships, mentors, and jobs. It also provides support for faculty teaching and research activities in real estate and, through the Real Estate Foundation, assists the university with its real estate portfolio.

### *Burridge Center for Securities Analysis and Valuation*

The Burridge Center for Securities Analysis and Valuation is dedicated to encouraging and supporting the creation and dissemination of new knowledge about the world financial markets with an emphasis on the U.S. financial markets by:

- facilitating the exchange of ideas and knowledge between professional investment managers, finance scholars, policy makers, and the investing public;
- identifying critical research issues in the theory and practice of security analysis and valuation; and
- encouraging and supporting rigorous qualitative and quantitative research on topics relevant and useful to money managers, valuation experts, and finance academics.

### *Curriculum Emphasis on Social Responsibility*

The Curriculum Emphasis on Social Responsibility (CESR) was established to help students to become the outstanding business leaders of tomorrow by preparing them to meet the ethical challenges posed by a highly competitive, globally connected business world. It is the purpose of CESR to oversee the inculcation of values discussions in classes throughout the undergraduate and graduate curricula at the Leeds School of Business.

Currently, CESR is responsible for the infusion of values through the required undergraduate business curriculum. The program is directly responsible for the staffing and coordination of all sections of BCOR 1010 (freshman level); the development, staffing, and coordination of courses materials and course delivery for BCOR 3010 (junior level); offering assistance to BCOR 2000 (sophomore level) instructors in the development of class materials; the oversight and coordination of BCOR 4000 (senior level) offerings; and the scheduling and execution of elective courses such as Leadership Challenges: Exercises in Moral Courage and Business Solutions to Global Poverty: Learning through Service and Sustainable Operations.

### *Center for Business Integration*

The Center for Business Integration (CBI) creates opportunities for local business people, business students, and faculty to collaborate in solving business problems. Through project-based learning, CBI connects the experience provided by local companies, the knowledge created by the university, and the work done by students at CU-Boulder. CBI brings real world projects to the classroom for local companies. After projects have been selected, CBI provides support to faculty and students during project planning and execution.

CBI seeks projects that provide students with valuable experience that will be relevant to them as future employees. Successful past projects include: supply-chain audits and recommendations for improvement; website design; software selection; information system review and recommendations for improvement; new product design; business process review; internal control review; database design; product costing; business report design; business intelligence; and many more.

### *Career Opportunities*

Leeds School of Business graduates are prepared for positions in the following fields:

- Accounting—public, private, nonprofit, and governmental
- Banking and other financial institutions
- Consulting
- Corporate financial management
- Entrepreneurship and small business management
- Financial analysis
- Human resources management
- Information systems
- International business
- Investment management
- Management consulting and organization management
- Marketing and sales management
- Nonprofit management
- Operations management
- Real estate
- Recreation and tourism management
- Retailing
- Taxation
- Technology management
- Transportation
- Venture capital

Other graduates hold positions in fields as diverse as business journalism, public relations, city planning, chamber of commerce and trade association management, college administration, and government. The entrepreneurial area of application prepares students to start their own business ventures to take positions in emerging growth companies and the venture capital industry.

## Study Abroad

Study abroad programs are available for students interested in international business or in cultural experiences abroad. The college-sponsored London Seminar in International Finance and Business is a five-week-long program held each summer in the financial district of London and is open to juniors, seniors, and graduate students.

### Student Organizations

Listed below are organizations that promote professional interests and provide recognition of scholastic attainment:

- AIESEC, international business association
- Alpha Kappa Psi, professional business society
- AYI (Academy of Young Investors)
- Beta Alpha Psi, national honorary and professional accounting society
- Beta Gamma Sigma, national honorary scholastic society in business
- BizChicks, undergraduate women in business organization
- CEO (Collegiate Entrepreneurs Organization)
- CUAMA, student chapter of the American Marketing Association
- CU Entrepreneurship Organization
- CUFMA (CU Financial Management Association)
- Delta Nu Alpha, honorary transportation society
- Delta Sigma Pi, professional business society
- Doctoral Business Student Association
- Graduate Entrepreneurs Association
- Graduate Women in Business
- IBC (International Business Club)
- ISO (Information Systems Organization)
- Leadership Council
- MBA Association
- MBA Entrepreneurial Solutions LLC
- MBSA (Minority Business Students Association)
- Phi Chi Theta, professional business and economics society
- Real Estate Club
- RMIM (Rocky Mountain Investment)
- SAM (Student Association of Management)
- SHRM (Society for Human Resource Management)
- Sigma Iota Epsilon, professional and honorary management society
- Student Business Board

## Leeds School of Business

### Student Government

As the student governing body of the Leeds School of Business, the Business Board functions as a liaison between the students and the administration. The board helps formulate policies and represents students' interests in many different areas. Thirteen representatives are elected from the student body and serve for two semesters. Three board members, usually officers, are required to serve on the Leeds School of Business Academic Ethics Committee.

### Graduation Recognition Ceremony

Every December and May, the Office of the Dean and the Leeds Business Student Government sponsor a recognition ceremony honoring the graduating class, in addition to the university-wide commencement. Graduates and their families are invited to attend.

## Undergraduate Academic Excellence

### Honors

In recognition of high scholastic achievement, upon recommendation of the faculty, the designation "With High Distinction" or "With Distinction" will be awarded at graduation. To qualify

for the "With High Distinction" designation, the student's cumulative University of Colorado GPA must be at least 3.90. For the "With Distinction" designation, the student's cumulative GPA must be at least 3.75 but less than 3.90. In addition, for these designations, at least 60 semester hours must have been earned at CU-Boulder.

In addition to the distinction of honors, Leeds School of Business students also may participate in the Latin honors granted by the College of Arts and Sciences. Qualified students are encouraged to participate in this program, which coordinates the offering of a variety of honors seminars as well as the granting of Latin honors (cum laude, magna cum laude, summa cum laude) at graduation. Granting of these honors is determined by the Honors Council based on several criteria, including the quality of original scholarly work (generally reported in the form of a thesis). Latin honors are not conferred on a graduate entering in the summer of 1995 and thereafter simply by virtue of high grades. Interested students should consult the Honors Program listing in the College of Arts and Sciences section or contact the Honors Program in Norlin Library.

### Dean's List

Students in the Leeds School of Business who complete at least 12 semester hours of graded work in the fall or spring semester and earn a GPA of 3.500 or better on the Boulder campus are included on the dean's list, which is posted outside the Office of Undergraduate Studies.

### Beta Gamma Sigma

Membership in Beta Gamma Sigma is an honor that must be earned through outstanding scholastic achievement. Such membership is the highest scholastic honor that a student in a school of business or management can attain.

To be eligible for Beta Gamma Sigma membership, students must rank in the top seven percent of their junior class, the top 10 percent of their senior class, or be among the top 20 percent of those students receiving master's degrees. Also, students completing all requirements for the doctoral degree conferred by a business school are eligible for Beta Gamma Sigma. It should be noted that Beta Gamma Sigma chapters may be chartered only in those schools of business and management accredited by AACSB, the International Association for Management Education.

### Scholarships

Each year the college awards a number of divisional and general scholarships. Business scholarships are for students who have completed business course work at the university. The amount and number of the awards vary each year. For additional information, students may contact the Office of Undergraduate Studies.

## Undergraduate Academic Standards

### Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery or falsification of official records, and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university. Reported acts of academic dishonesty must be referred to the Honor Council.

Students are advised that plagiarism consists of any act involving the offering of someone else's work as the student's own.

It is recommended that students consult with instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Official college procedures concerning academic ethics are maintained in the Office of Undergraduate Studies.

### Standards of Performance

Students are held to basic standards of performance with respect to attendance, active participation in course work, promptness of assignments, correct English usage both in writing and speech, accuracy in calculations, and general quality of scholastic workmanship.

In general, examinations are required in all courses and for all students, including seniors.

#### *Good Academic Standing*

To be in good standing, students must have an overall grade point average of C (2.000) or better for all course work taken, and a 2.000 or better for all business courses taken. Students must earn a passing grade for all required courses. This requirement applies to work taken at all university campuses. Physical education activity courses and repeat courses (not taken through course repetition) are not included in the overall or business grade point average.

Any student earning all, or nearly all, failing grades or no academic credit for a semester will not be permitted to register without the dean's approval.

Official double-degree students must maintain required academic standards for the Leeds School as well as their other college.

When semester grades become available, students below the acceptable standard will be placed on probation or suspension. Students are responsible for being aware of their academic status at all times, and late grades and/or late notification do not waive this responsibility. College rules governing probation and suspension are as follows:

**Probation.** Students whose cumulative grade point average or cumulative business grade point average falls below 2.000 will immediately be placed on probation for one semester. Those students who enroll in any term in the calendar year, excluding summers, after being placed on probation, are expected to raise their cumulative and business grade point average to at least a 2.000.

**Scholastic Suspension.** Students who still have a cumulative overall and/or business GPA below 2.000 after one semester of probation, will be suspended and will not be able to register for University of Colorado daytime courses on any campus for one academic year, not including summer. Suspended students may choose one of the following four options:

1. They may attend summer session at any campus of the University of Colorado and take classes in order to improve their grade point average in the area of deficiency.
2. They may take Continuing Education Independent Learning courses, and/or Boulder Evening credit classes.
3. They may choose to attend another educational institution and apply for readmission only when they have overcome their grade deficiencies by means of averaging the grades from CU with the grades from the other institution. These transfer grades are used only for the purpose of readmission and do not remain in the University of Colorado grade point average. If they choose this option, upon readmission, students will have two semesters to raise their CU cumulative or business GPA to the required 2.000, provided they make

academic progress. If their GPA falls after the first semester, they will again be suspended for another academic year.

In order to attend another university, students must have their proposed course work approved by the Office of Undergraduate Studies of the Leeds School of Business.

4. Students who have been under suspension for one calendar year and elected none of the above may still apply for readmission. They will have two semesters to raise their cumulative or business grade point average to at least a 2.000, provided they make academic progress and earn no grade less than C. If their GPA falls after the first semester, they will again be suspended for another academic year or until the grade deficiency has been made up.

Students who make up their grade deficiencies prior to the expiration of the one-year suspension by pursuing any of the above options, and desire to be readmitted, may reapply by following the process outlined below.

Suspended Leeds School students who transfer into another school or college of the university will not be eligible to register for business courses and will be subject to administrative drops.

**Readmission.** Readmission is subject to enrollment limitations. To be readmitted, students must request readmission by contacting the Office of Undergraduate Student Services at UCB 419, Boulder, CO 80303, **303-492-6515**. They must then provide undergraduate student services with a written request to return. After doing so, they must reapply by submitting an application through the Office of Admissions.

### Undergraduate Admission and Enrollment Policies

All students are responsible for knowing and following the provisions set forth below. Any questions concerning these provisions should be directed to the college. The college cannot assume responsibility for problems resulting from a student's failure to follow the policies stated here or from incorrect advice given by those outside the Office of Undergraduate Studies. Similarly, students are responsible for all deadlines, rules, and regulations stated in the General Information section of this catalog. All rules and regulations are subject to change. Any questions should be directed to the Leeds School of Business, Office of Undergraduate Studies, room 227, **303-492-6515**.

#### Admission to the Business Program

Prospective freshman students are encouraged to complete strong academic programs in high school. A minimum of four academic units should be completed each year with special emphasis given to writing, mathematics, and science skills. For a detailed explanation of the high school preparation desired, see Undergraduate Admission in the General Information section.

Transfer students are expected to demonstrate proficiency in economics, writing, and mathematics. Prospective transfer students should complete courses equivalent to those taken by University of Colorado business freshmen and sophomores.

#### *Intrauniversity Transfer*

An undergraduate student who is enrolled on the Boulder campus and wishes to transfer to the Leeds School of Business and Administration may submit a completed application for the fall or spring semester. A cumulative university GPA of 3.300 and a cumulative GPA of 2.000 in business courses is necessary to

be considered for admission. In addition, students must have 24 completed semester hours, 12 of which must be graded work at CU-Boulder; 6 credit hours of math, including MATH 1071 or ECON 1078, and MATH 1081 or ECON 1088 or a calculus course; and microeconomics and macroeconomics. Students must earn a grade of B- or better in ECON and MATH to be considered for admission. Intrauniversity transfer students must take a minimum of 30 hours of business courses, including their area of emphasis, in residence after admission to the college. The deadline is October 1 for spring admission and March 1 for fall admission. Students must attend an IUT meeting to obtain an application. For more information on intrauniversity transfer, see [leeds.colorado.edu](http://leeds.colorado.edu).

### Registration Stops

A stop will be placed on students' records when they have earned 60 credit hours, if they have not yet declared their area of emphasis.

### Registration for Business Courses

Business students may register only for those courses for which they have the stated prerequisites.

### Administrative Drops

Instructors may recommend to the Office of Undergraduate Studies that students who fail to meet expected course attendance or prerequisites be dropped from their courses at any time during the semester.

### Attendance Regulations

Classroom attendance is left to the discretion of the instructor. Students are responsible for understanding each instructor's policy on attendance.

Students who are unavoidably absent should make arrangements with instructors to make up the work missed. Failure to attend regularly may result in receipt of an *F* in a course. Students who, for illness or other legitimate reasons, miss a final examination must notify the instructor no later than the end of the day on which the examination is given. Failure to do so may result in receipt of an *F* in the course.

### Concurrent Registration

Concurrent registration is for graduating seniors who must be enrolled on two campuses of the University of Colorado at the same time in order to fulfill graduation requirements.

Students enrolled in the Leeds School of Business may exercise the concurrent registration option if they are in their graduating semester or are two semesters from graduating and cannot obtain a course necessary to complete a prerequisite sequence. The course must be required for graduation and must not be offered on the Boulder campus, or the course must conflict with another required course in which the student is enrolled. Students from other colleges and schools who wish to take business courses must have the approval of their own college or school before submitting the concurrent registration form.

### Scholastic Load

The normal scholastic load of an undergraduate student in the college is 15 semester hours, with a maximum of 18 hours during the fall and spring semesters. A maximum of 3 semester hours may be taken during Maymester. A maximum of 6 hours may be taken during a five-week summer term, with no more than 12 hours total during the 10-week summer session.

### Credit Policies

To receive credit, all courses must be listed on the student's official transcript by the Office of the Registrar. Credit is then evaluated by the Leeds School of Business to determine degree acceptability.

#### Cooperative Education Credit

No credit is given for work experience or cooperative education programs.

#### Correspondence Credit

All correspondence courses must have prior approval and be evaluated to determine their acceptability.

#### Credit by Examination

**Advanced Placement (College Board).** For students who earn scores of 3, 4, or 5 on Advanced Placement exams, college credit will be given where appropriate. See the General Information section for a comprehensive chart on AP credit.

**College-Level Examination Program (CLEP).** College credit for approved CLEP subject examinations may be considered, providing the scores are at the 67th percentile or above. Specific information is available in the Office of the Dean.

CLEP credit is only appropriate for nonbusiness requirements and nonbusiness electives. A maximum of 6 hours of credit in any one course area is allowed. CLEP may not be used in course areas where credit has already been allowed. General examinations are not acceptable. CLEP credit is not transferable.

Before a CLEP examination can be taken, students must have prior approval in writing by the Office of Undergraduate Studies.

#### No Credit

Because of enrollment limitations, business classes may not be taken on a no-credit basis.

#### Special Sources of Credit

The college reserves the right to accept or reject all special sources of credit that do not have prior approval of the dean.

#### Independent Study

A maximum of 6 hours of independent study will be accepted as degree credit. Prior approval is required if the work is to be applied as degree credit. A maximum of 3 hours may be taken in any one semester.

#### Study Abroad Credit

Transfer credit from study abroad programs may be applied to the business degree. Students planning to attend study abroad programs must meet with an undergraduate advisor and have their course selections approved prior to leaving campus.

More specific information about these opportunities is available from the Office of International Education.

#### Transfer Credit

The school reserves the right to disallow any credit that it deems inappropriate degree credit.

Credits in business subjects transferred from other institutions will be limited to the number of credit hours given for equivalent work in the regular offerings of the university. Only work from regionally accredited institutions will transfer to the college. A maximum of 60 semester hours of credit may be accepted from a two-year school.



Actual equivalent courses may be substituted for required courses. Students must submit a carefully checked catalog description and course syllabus for course equivalency determination.

Business students desiring to apply course work from another institution or University of Colorado campus toward the BS degree in business administration must have prior approval of the Leeds School of Business. Only nonbusiness requirements or elective credit is acceptable in transfer from other institutions once the student has enrolled.

All courses in the area of emphasis must be taken at the University of Colorado at Boulder unless written approval is given by the associate dean of undergraduate studies. Transfer students must take a minimum of 30 hours of business courses, including the area of emphasis, in residence after admission to the college. For more information on transfer of credit policies, see Transfer of College-Level Credit in the Admission section.

### Grading Policies

In addition to the campuswide grading system and *pass/fail* policy listed under Registration in the General Information section, the Leeds School of Business enforces the following policies.

#### Pass/Fail

Students in the Leeds School of Business may not use courses taken on a *pass/fail* basis to fulfill the General Education Core Requirements, courses used to satisfy the **Minimum Academic Preparation Standards (MAPS)**, **business core requirements**, **business major requirements**, or **business electives**. Only non-business electives may be taken on a *pass/fail* basis. A maximum of 6 hours of *pass/fail* credit may be applied toward the BS degree in business administration. *Pass/fail* determination must be made within the first two weeks of the semester and is irreversible. A maximum of 6 hours designated *pass/fail* may be taken in any one semester.

**Failed Courses.** Failed courses may be repeated, but the *F* will be included in the GPA if the course is not repeated under the course repetition policy.

#### Repeat Credit

The Course Repetition program allows students who receive a grade of *D+* or lower in their original course (for graduate students, a grade of *C+* or lower) to repeat the course. The original grade will still appear on the transcript, but will be removed from both the total credit hour calculation and GPA. This gives students the ability to try to improve their GPA by repeating a course in which they did poorly the first time. Visit [registrar.colorado.edu/students/registration/course\\_repetition.html](http://registrar.colorado.edu/students/registration/course_repetition.html) for course repetition rules.

#### Incomplete Grades

The only incomplete grade given in the college is *I*. An *I* grade is given only when documented circumstances clearly beyond the student's control prevent the student from completing the course. Generally, students should make up the missing work and not retake the entire course. Students should not register for the class a second time, unless directed by the instructor. All *I* grades must be made up within one year or the *I* will be changed to a grade of *F*.

#### Grade Changes

Final grades as reported by instructors are considered permanent and final. Grade changes will be considered only in cases

of documented clerical errors, and must be approved by the associate dean.

### Withdrawal

Students may withdraw from the university any time before the beginning of the final examination period.

Students who withdraw during the semester are not assured admission the following semester but will be considered on an individual basis, if space is available.

## Undergraduate Degree Requirements

### Knowledge and Abilities of Business Students

The following areas of knowledge are central to the undergraduate degree in business administration:

- knowledge of core business concepts that provides students with a comprehensive understanding of the basic functional areas of the discipline;
- knowledge in one or more of the five areas of emphasis, in which students are exposed to in-depth study that provides them with the tools necessary to solve complex business problems;
- awareness of the interrelations between academic theory and practice in order for students to be fully equipped to make effective decisions;
- strong verbal and written communication skills, proficiency in business computer applications, and knowledge of international business environments;
- knowledge of mathematics sufficient to facilitate the application of quantitative principles; and
- awareness of the importance of academic fields in the area of arts and sciences, with special emphasis placed on the study of economics, political science, and other related fields.

In addition, students completing a degree in business administration are expected to acquire:

- the ability to apply basic business principles to solve problems in new and recurring situations;
- the ability to conceptualize and analyze decision-making situations to facilitate solutions in an effective and timely manner; and
- the ability to effectively communicate the results of problem-solving situations, both verbally and in writing.

Having acquired these skills and knowledge, students are able to conceptualize and analyze the concept of business and problem solving as a system. They have the ability to present solutions to business problems in an understandable and useful form. Their education provides them with excellent working knowledge, not only in the field of business, but also in related academic disciplines.

### Advising and Records

Business students receive academic counseling from a staff of advisors in the Office of Undergraduate Student Services. During the semester, advisors are available Monday through Friday from 9:00 A.M. to noon and 1:00 P.M. to 4:00 P.M., and by appointment.

Faculty advisors are available to discuss the various areas of emphasis as well as career opportunities. Faculty advising hours will vary each semester.

Students may look at their individual progress sheet any time during advising hours, and a copy will be provided upon request with proper identification. Students are expected to assume responsibility for planning their program in accordance with college rules and policies.

Students are encouraged to discuss the various emphases available as well as career opportunities with the faculty of the college.

## Requirements for the BS (Business Administration) Degree

The bachelor of science degree requires:

**Skills Assessment.** These requirements are designed to ensure that each student has attained a minimum level of competency in the areas of finite math and Excel.

**Total Credits.** A minimum of 120 acceptable semester hours of credit, as follows:

<i>Required Courses</i>	<i>Semester Hours</i>
Business core requirements . . . . .	28
Business area of emphasis requirements . . . . .	18
Business electives . . . . .	15
Nonbusiness course requirements . . . . .	42
Nonbusiness electives . . . . .	17

The school reserves the right to disallow any credit that it determines is not appropriate academic credit.

**Residence.** Students must complete 30 hours of business courses in residence on the Boulder campus after admission to the college, including the 18 hours in the area of emphasis and the 9 hours in the area of application (included in the business electives). Students must be in residence at CU-Boulder, and must be registered as business degree students during the term of graduation.

### Minimum Grade Point Average.

- A cumulative grade point average of 2.000 in the area of emphasis *and all grades* in the 18 credit hours must have a grade of C- or higher (no *pass/fail* credits can be applied to the area).
- A minimum scholastic cumulative GPA of 2.000 is required for all courses attempted at the university.
- A cumulative 2.000 is required for all business courses attempted at the university.
- A cumulative grade point average of 2.000 is required in the area of application courses.

## General Requirements

### *Business Core Requirements (31 semester hours)*

<i>Required Courses</i>	<i>Semester Hours</i>
BCOR 1010 Introduction to Business . . . . .	3
BCOR 1020 Business Statistics. . . . .	3
BCOR 2000 Accounting and Financial Analysis . . . . .	4
BCOR 2200 Introductory Finance. . . . .	3
BCOR 2300 Adding Value with Management . . . . .	3
BCOR 2400 Fundamentals of Marketing . . . . .	3
BCOR 2500 Operations and Information Management . . . . .	3
BCOR 3000 Business Law, Ethics, and Public Policy . . . . .	3
BCOR 3010 Business Applications of Social Responsibility. . . . .	3
Business Area of Emphasis (18 semester hours)	

Students must choose an area of emphasis in accounting, finance, systems, management, or marketing. Areas of emphasis consist of 18 semester hours beyond any business core courses.

### **Business Electives (15 semester hours)**

Business courses required for areas of application are included in business electives.

Business courses required by specific areas in excess of the 18 hours listed under areas of emphasis may count as business electives.

### **Nonbusiness Requirements (42 semester hours)**

Mathematical skills (Note 1) . . . . .	6
Written communication (3 hours upper-division) . . . . .	6
Historical context . . . . .	3
Cultural and gender diversity. . . . .	3
United States context . . . . .	3
Literature and the arts (3 semester hours must be upper-division) . . . . .	6
Natural sciences. . . . .	6
Contemporary societies (Note 2). . . . .	6
Ideals and values . . . . .	3

A list of courses that fulfill specific requirements for each area can be found on the CU website at [www.colorado.edu/artssciences/students/undergraduate/core.html](http://www.colorado.edu/artssciences/students/undergraduate/core.html).

### **Curriculum Notes**

1. Students may complete the math requirements by taking MATH 1071 and 1081. A college-level calculus course may be substituted for MATH 1081. Passing an assessment test for MATH 1071 will exempt a student from the course but carries no credit (a maximum of two attempts).

Two semesters of college calculus will satisfy the 6 hours of math.

2. A minimum of 3 semester hours each of microeconomics and macroeconomics is required.

### **Nonbusiness Electives (17 semester hours)**

Not all classes are accepted as elective credits. Generally, to be acceptable, electives must have a form of assessment such as a term paper and/or examinations, and must be regular classroom-type courses. Course coverage must be college level, must not be repetitious of other work applied toward the degree, must be academic as opposed to vocational or technical, and must be part of the regular university offerings.

Specifically, the college will accept:

- A maximum of 12 hours of nontraditional credit. However, only 6 hours maximum from each of the following categories will apply as a part of the 12 hours: 6 hours of independent study, 6 hours of performance classes (choir, band, guitar, etc.), 6 hours of fine arts (painting, drawing, etc.), and 6 hours of physical education theory and dance. The college will not accept repeat credit (unless it is taken under the course repetition program), workshops, orientations, practica, certain teacher education classes, or certain classes offered by the College of Arts and Sciences.
- The only approved exceptions to the 6-hour limit in each category are 12 hours of ROTC credit, and 12 hours of PRLC credit.

The previous examples are not exclusive but are intended to be guidelines.

The Leeds School of Business reserves the right to disallow any credit that it determines is not appropriate academic credit. For more information, contact the Office of Undergraduate Student Services.

## Senior Audit

Prospective graduates must sign up for a senior audit with the Office of Undergraduate Studies and the Office of Career Development the semester before they plan to graduate. Students planning to graduate in May must request a senior audit by the previous October 1; August graduates must request a senior audit by the previous October 1; and December graduates must request a senior audit by the previous March 1. Failure to do so will delay graduation.

Students desiring to change their area of emphasis after completing the senior audit must request the change through their

advisor no later than the first week of class of their final semester. Changes after that time will delay graduation.

## Double-Degree Programs

Numerous career opportunities exist for graduates trained in both a specialized field and business. For this reason students may be interested in a double-degree program leading to completion of degree requirements concurrently in two fields. Such double-degree programs have been arranged for engineering, environmental design, journalism, and music, and may be arranged for other professional combinations as well.

The two programs of study proceed concurrently, terminating together with the awarding of two degrees. Normally, at least five years will be needed to complete a double-degree program. No substitutions are allowed, and a minimum of 150 semester hours is required for all double-degree programs.

Students desiring to transfer from double-degree programs to the Leeds School of Business must submit an application to the Office of Undergraduate Studies.

For further information contact the Office of Undergraduate Studies.

## Summer Program: Minor in Business

A minor in business consists of 22 semester hours successfully completed in addition to any prerequisite courses.

<i>Required Courses</i>	<i>Semester Hours</i>
BCOR 1010 Intro to Business . . . . .	3
BCOR 1020 Business Statistics. . . . .	3
BCOR 2000 Accounting and Financial Analysis . . . . .	4
BCOR 2200 Introductory Finance. . . . .	3
BCOR 2300 Adding Value with Management. . . . .	3
BCOR 2400 Fundamentals of Marketing. . . . .	3
BCOR 2500 Operations and Information Management . . . . .	3

In addition to the required 22 semester hours of course work, the following requirements apply to the minor program in business:

- No *pass/fail* work may be applied toward the minor.
- The cumulative GPA for all minor degree course work must equal 2.000 or higher.
- Students will be allowed to apply no more than 9 credit hours of transfer work to BCOR requirements.
- Students must complete prerequisite courses as stated in the course descriptions.
- Successful completion of a computing skills course or successful completion of the Excel assessment exam.

## Areas of Emphasis: Leeds School of Business Programs

All business students pursuing a bachelor's degree in business administration must complete the prescribed courses in at least one area of emphasis. The school offers programs in five areas of emphasis: accounting, finance, systems, management, and marketing. An area of emphasis consists of a minimum of 18 semester hours taken at the University of Colorado at Boulder. A cumulative grade point average of 2.000 is mandatory for the required area of emphasis courses and all courses must have a grade of C- or higher.

In addition to the area of emphasis, students also may complete an area of application. The school offers the following areas of application: entrepreneurship and small business management,

international business, and real estate. An area of application consists of a minimum of 9 semester hours taken at the University of Colorado at Boulder. A 2.000 cumulative GPA is required for the required area of application courses. Successful completion of additional requirements in some of these areas of application entitles students to a certificate issued by the dean of the college.

The school also offers a minor program in business for nonbusiness students.

## Accounting

The accounting area of emphasis prepares students for careers in which they will develop, analyze, and interpret complex financial data. Accounting majors become experts in "the language of business." This expertise prepares them for careers in CPA firms, business consulting, industry (from Fortune 500 companies to small entrepreneurial enterprises), not-for-profit enterprises, or government. Accountants who develop careers in public accounting may become partners in public accounting and consulting firms. Those who make their careers in industry may have positions as a chief executive officer (CEO), chief financial officer (CFO), chief accounting officer (CAO) or controller, tax specialist, internal auditor, accounting systems analyst, financial analyst, or managerial accountant. Many students begin their careers in CPA firms and move to industry or government after several years of experience. Employers seek students with skills in communication, interpersonal interactions, analytical thinking, problem solving, and integrity.

The four major areas of study in the accounting area of emphasis are: Financial Accounting and Analysis, Tax Planning and Compliance, Managerial Accounting, and Auditing and Assurance Services. Basic course work in accounting focuses on developing a comprehensive understanding of the theory and concepts underlying the presentation of financial and operating information about an enterprise to external and internal users. Additional course work exposes the student to income taxation of business enterprises and individuals, the practice and principles of auditing and assurance services, and cost management. Specialization is available through graduate work.

Most accounting students from the University of Colorado earn professional credentials within a few years of completing their degrees. The two major types of professional certification are certified public accountant [CPA] and certified management accountant [CMA]. The CPA's expertise focuses on presentation and analysis of financial information for an external user. The CMA's primary focus is improving information for the internal user. Professional accountants' expertise in financial matters and their understanding of company operations through financial information prepare them to become key players and critical decision makers for all aspects of business creation, operation, and transformation.

Requirements for the CPA license vary significantly by state. Every state requires that the candidate pass the Uniform CPA Examination (a standard national exam), but the requirements regarding educational background and work experience are state-specific. Colorado is one of the few states that requires only a bachelor's degree (at least 120 hours) to sit for the CPA exam. Most states have passed rules requiring 150 hours of university education. All states write their own rules about the number of hours, specific courses, and experience required for becoming a CPA in that state. **It is very important that the accounting student obtain the guidelines for the relevant state to ensure proper development of his or her degree plan (see [NASBA.org](http://NASBA.org)).**

The degree options are:

**1. The bachelor of science in business administration with an emphasis in accounting.** This degree may be earned by a student who takes 18 hours of accounting beyond the core. The 18-hour requirement for the degree does not qualify the student to sit for the CPA exam in any state. This option may be chosen by a student who does not want to become professionally certified but who seeks a career involving accounting and financial analysis in industry, government, or not-for-profit enterprises.

The undergraduate area of emphasis in accounting consists of at least 18 semester hours of course work beyond the undergraduate core requirements.

<i>Required Courses</i>	<i>Semester Hours</i>
ACCT 3220 Corporate Financial Reporting 1 . . . . .	3
ACCT 3230 Corporate Financial Reporting 2 . . . . .	3
ACCT 3320 Cost Management . . . . .	3
ACCT 4850 Senior Seminar in Accounting . . . . .	3
Plus at least 6 credit hours from the following courses:	
ACCT 4240/5240 Advanced Financial Accounting . . . . .	3
ACCT 4250/5250 Financial Statement Analysis . . . . .	3
ACCT 4330/5330 Advanced Cost Management . . . . .	3
ACCT 4440/5440 Income Taxation . . . . .	3
ACCT 4540/5540 Accounting Information Systems . . . . .	3
ACCT 4620/5620 Auditing and Assurance Services . . . . .	3
ACCT 4800/5800 Government and Non-Profit . . . . .	3
ACCT 4820/5820 Special Topics . . . . .	3

**2. The bachelor of science in business administration with an emphasis in accounting, enhanced by additional course work required to sit for the CPA exam in various states.** The student who aspires to earn the CPA credential must go beyond the basic college requirements for earning an area of emphasis. These requirements vary by state, but always include significantly more hours in accounting. Faculty advising is available, but each student is responsible for determining the relevant requirements for the desired state of residence following graduation (see [NASBA.org](http://NASBA.org)).

**3. The concurrent bachelor of science/master of science degree in business administration with a concentration in accounting or taxation.** This program allows the student to earn both a bachelor's and a master's degree. Both concurrent degrees may be in accounting, but many students who choose the concurrent degree option plan their programs so that they are awarded a bachelor's degree emphasizing finance or systems and a master's degree in accounting. This program includes an optional (but highly recommended) for-pay/for-credit internship. This degree plan best prepares the student for becoming a CPA. Details on this program are provided under the Graduate Degree Programs section.

None of the degree options described above qualifies the student for the Colorado "education in lieu of experience" CPA licensing rule. Additional planning and course work is necessary to meet this rule.

## Finance

The finance area of emphasis is designed to provide students with in-depth exposure to the theoretical concepts and applied tools and techniques necessary for entry-level positions in various areas of financial management. The principal areas of study include business financial management, investments and derivative securities, and financial markets and institutions.

Finance is an applied discipline with an analytical orientation. Effort is made to develop students' ability to think logically about financial problems and to formulate sound financial decisions and policies. Although the emphasis is on financial

management of profit-oriented organizations, the principles and concepts developed are also applicable to not-for-profit and governmental organizations.

It is strongly recommended that finance students take additional accounting courses.

<i>Required Courses</i>	<i>Semester Hours</i>
FNCE 3010 Corporate Finance . . . . .	3
ACCT 3220 Corporate Financial Reporting I . . . . .	3
FNCE 4030 Investment and Portfolio Management . . . . .	3
FNCE 4850 Senior Seminar in Finance . . . . .	3
Plus any three of the following courses:	
FNCE 4000 Financial Institutions Management . . . . .	3
FNCE 4040 Derivative Securities . . . . .	3
FNCE 4050 Capital Investment Analysis . . . . .	3
FNCE 4060 London Seminar in International Finance and Business (3 credit hours can be applied toward the finance area of emphasis) . . . . .	variable credit
FNCE 4070 Financial Markets and Institutions . . . . .	3
FNCE 4820 Experimental Course (only one FNCE 4820 course can be applied to meet the finance area of emphasis requirements) . . . . .	3
In addition, one of the following non-FNCE prefix elective courses can be substituted for one of the above FNCE elective courses to meet finance area of emphasis requirements.	
APPM 4720 Mathematical Finance . . . . .	3
ESBM 4570 Entrepreneurial Finance . . . . .	3
INBU 4200 International Financial Management . . . . .	3
REAL 4100 Real Estate Finance and Investment Analysis . . . . .	3

## Quantitative Finance Certificate

The Quantitative Finance Track is one of two tracks that make up the Actuarial Studies and Quantitative Finance Certificate Program and is co-sponsored by the Leeds School of Business and the College of Arts and Sciences. The program is interdisciplinary and rigorous. The goal of the program is to augment the financial education provided by the Leeds School with a more extensive mathematical base.

The analytical demands of business are increasing rapidly and constantly. This program is designed to prepare students for the increased requirements of the most attractive financial analyst positions. In addition, the program provides a solid base for success in graduate studies.

Program requirements are extensive and challenging. Students must maintain a GPA of 3.000 for all courses fulfilling program requirements and must achieve a grade of B or better in each of calculus 1, 2, and 3. Most students will begin study during the freshman year and continue throughout their undergraduate career. A brief summary of course requirements is presented below. For a complete list of requirements and further information regarding the quantitative finance track and the related actuarial studies track, see the Actuarial Studies Program website. The certificate program is also described in the College of Arts and Sciences section. Interested students should contact the Chair, Finance Division, Leeds School of Business.

<i>Area of Study</i>	<i>Credit Hours*</i>
Finance and Accounting . . . . .	25
Mathematics and Statistics . . . . .	23
Economics . . . . .	14
Computer Programming . . . . .	3

\* Number of credit hours may vary according to the specific courses completed.

## Management

The management area of emphasis addresses the effective management of people, organizations, and technology to improve

the performance of diverse public and private organizations. The area provides the managerial skills necessary for success in entry-level positions, and builds the foundations required for success in management positions of greater responsibility, authority, and leadership. Students completing the management area of emphasis are viewed by potential employers as having the broad-gauged education required in the team-oriented, horizontally organized, and globally competitive environments of the 21st century. The management area of emphasis prepares students for careers in general management or can serve as a strong secondary major to complement another functional area.

The management area of emphasis begins with three required courses covering modern theories of quality management and the development of critical managerial skills.

Students must choose one of two tracks, one emphasizing the management of human resources, and the other emphasizing the management of operations. Cross-over courses are also possible with students in one track taking elective courses in the other track.

#### Human Resource Management Track

<i>Required Courses</i>	<i>Semester Hours</i>
MGMT 3030 Critical Leadership Skills . . . . .	3
MGMT 4000 Strategic Management . . . . .	3
MGMT 4850 Senior Seminar in Management . . . . .	3
Plus three of the following courses:	
MGMT 4010 Employee-Employer Relationship . . . . .	3
MGMT 4020 Hiring and Retaining Human Resources . . . . .	3
MGMT 4030 Managing Employee Reward Systems . . . . .	3
MGMT 4040 Individual, Team, and Organizational Development . . . . .	3

The human resource management track provides students with the knowledge and skills necessary to earn certification in human resources from the Society of Human Resources, the principal professional society in the field. Graduates are qualified to act as human resource generalists in small- to medium-sized companies; specialists in organizations with more diverse human resource units; or well-rounded general managers in any organization.

#### Operations Management Track

<i>Required Courses</i>	<i>Semester Hours</i>
MGMT 3030 Critical Leadership Skills . . . . .	3
MGMT 4000 Strategic Management . . . . .	3
MGMT 4850 Senior Seminar in Management . . . . .	3
OPIM 3030 Management of Service Operations . . . . .	3
Plus two of the following courses:	
MGMT 4070 International Operations Management . . . . .	3
MGMT 4080 Environmental Operations . . . . .	3
OPIM 4050 Supply Chain Management . . . . .	3
OPIM 4060 Managing Business Processes . . . . .	3

The principal function of any organization is the efficient creation and delivery of products and services to its customers. The operations management track focuses on this creative process and identifies how organizations use productivity, quality, flexibility, timeliness, and technology to compete and prevail in their markets. Students graduating from the operations management track will have a broad understanding of the importance of operations in the success of any organization, and will be qualified to serve in entry-level line management positions and as general managers later in their careers.

## Marketing

The marketing area of emphasis hones skills in analysis and decision-making for a wide spectrum of marketing careers in fields such as advertising, market research, brand management, e-business, selling and sales management, distribution, industrial and business-to-business marketing, international marketing, the marketing of services, and marketing for not-for-profit organizations.

Marketing strategies are essential to the communication and sale of both products and services. They are applied across consumer and business markets, across domestic and global boundaries, and across traditional and electronic business environments. Key concepts focus on identifying customer needs and wants, developing products and/or services to satisfy these needs and wants, establishing channels and communications to move products and services through intermediaries to end users, and monitoring transactions and customer responses to guide future activities.

Students should choose from one of the following two plans for taking required marketing courses. Students with a marketing emphasis must take 18 hours of marketing courses beyond BCOR 2400. These students should select Plan A. Plan B is intended for those students wishing to take marketing courses as part of their business electives.

*Students pursuing a marketing emphasis (Plan A) will need three semesters to complete the required course work (beyond BCOR 2400).*

#### Plan A

For students with marketing as their area of emphasis

<i>Required Courses</i>	<i>Semester Hours</i>
MKTG 3250 Buyer Behavior . . . . .	3
MKTG 3350 Marketing Research . . . . .	3
At least two of the following three courses must be taken as prerequisite to MKTG 4850. The remaining course (if not taken as a prerequisite) must be taken as a corerequisite to MKTG 4850.	
MKTG 4250 Product Strategy . . . . .	3
MKTG 4550 Advertising and Promotion Management . . . . .	3
MKTG 4820 Pricing and Channels of Distribution . . . . .	3
Required capstone course: MKTG 4850 Senior Seminar in Marketing . . . . .	3

#### Plan B

The following marketing courses are offered as business elective only:

<i>Required Courses</i>	<i>Semester Hours</i>
MKTG 3150 Sales Management . . . . .	3
MKTG 3250 Buyer Behavior . . . . .	3
MKTG 3450 International Marketing . . . . .	3
(Prerequisite course for marketing 3000 level courses BCOR 2400 Fundamentals of Marketing)	
Prerequisite courses for marketing 4000 level courses:	
MKTG 3250 Buyer Behavior . . . . .	3
MKTG 3350 Marketing Research . . . . .	3

## Operations and Information Management (formerly Systems)

Advances in business knowledge and technology have radically changed business systems and processes—for example, how organizations buy and sell goods and services, integrate their supply chain and logistic systems, and reach or retain customers. As a result, critical to today's businesses is the ability to get the right information to the right people at the right time, so that both strategic and operational decisions are made properly and quickly. Students majoring in operations and informa-

tion management will learn to recognize the pivotal roles that operations and information systems play in the business world and to use their knowledge to increase business competitiveness. They are exposed to a range of tools, methods, and techniques for addressing issues such as the design of business operations, the selection and implementation of new technologies, and the creation of processes that effectively connect with customers, suppliers, and distributor channels. Students are prepared to be leaders in the effective utilization of information in business.

### OPIM Curriculum

The following six courses are required for OPIM:

<i>Required Courses</i>	<i>Semester Hours</i>
OPIM 3000 Systems Thinking . . . . .	3
OPIM 3101 Business Technologies . . . . .	3
OPIM 3100 Business Intelligence . . . . .	3
OPIM 4050 Supply Chain Management . . . . .	3
OPIM 4060 Managing Business Processes . . . . .	3
OPIM 4850 Senior Seminar in Operations and Information Management . . . . .	3
Students also are encouraged to take other OPIM courses such as:	
OPIM 3030 Management of Service Operations . . . . .	3
OPIM 4040 IT and Business Strategy . . . . .	3
OPIM 4510 Design of Usable Business Systems . . . . .	3

In addition, students inclined to more technical information systems careers are encouraged to take programming courses as business electives (OPIM 2010 Visual-language Programming) or as non-business electives (such as CSCI 1300 Programming or ATLS 3519 Applied Java Programming).

### OPIM Certificate

To prepare students outside the division with OPIM education, the Leeds School of Business offers the OPIM Certificate, obtained by completing any three OPIM courses (3 credits each, a total of 9 credits) and either a faculty-supervised OPIM project (OPIM 4900 Independent Study) or internship (OPIM 4910 Academic Internship in Operations and Information Management). In addition, students are required to maintain an overall GPA of 3.000 or higher for the selected course sequence and receive a letter grade of B- or higher in each course. Successful completion of the certificate program will appear on the student's transcript.

<i>Recommended Course Sequences</i>	<i>Semester Hours</i>
<b>Accounting Students</b>	
OPIM 3000 Systems Thinking . . . . .	3
ACCT 4540 Accounting Information Systems . . . . .	3
ACCT 4820 Accounting Information Systems II . . . . .	3
<b>Finance Students</b>	
OPIM 3000 Systems Thinking . . . . .	3
OPIM 3100 Business Intelligence . . . . .	3
OPIM 4080 Project Management . . . . .	3
<b>Management Students</b>	
OPIM 3000 Systems Thinking . . . . .	3
OPIM 3100 Business Intelligence . . . . .	3
OPIM 4040 IT and Business Strategy . . . . .	3
<b>Marketing Students</b>	
OPIM 3000 Systems Thinking . . . . .	3
OPIM 3100 Business Intelligence . . . . .	3
OPIM 4510 Design of Usable Business Systems . . . . .	3

Students must contact the faculty advisor of OPIM to pursue the certificate. The advisor will assist in setting up an independent study or internship. Upon completion of all courses and requirements, students must contact the faculty advisor, who

will notify the undergraduate office that the certificate requirements have been completed.

### BS/MS Program

The Leeds School of Business also offers a unique program that allows undergraduates the opportunity to earn a bachelor's and master's degree simultaneously. The joint program graduates students with a bachelor's degree from the Leeds School of Business and a master's degree from the College of Engineering in telecommunications. For more information, see [itp.colorado.edu](http://itp.colorado.edu).

### Career Possibilities

A student completing the OPIM curriculum will be prepared for challenging careers as a business analyst, systems designer, management consultant, project manager, systems integration specialist, and outsourcing coordinator, among others. Career opportunities exist in financial operations, health care, management consulting, retail operations, manufacturing, transportation and logistics, service operations, and government. Organizations rely on people with an OPIM background to provide solutions to important problems of productivity, profitability, and competitiveness for a variety of business systems. When combined with a second area of emphasis in accounting, finance, management, or marketing, additional opportunities exist for analytic positions within these other business areas. Completing the OPIM curriculum also will help students to earn a Supply Chain Management certificate from the Association of Operations Management (APICS), and a Project Management certificate from the Project Management Institute (PMI).

## Areas of Application

### Entrepreneurship and Small Business Management

The entrepreneurship and small business management area of application reflects that practically all new job creation in the United States is produced by new ventures and small- to medium-sized emerging growth businesses. In addition, Boulder and the Leeds School of Business are highly recognized for a unique entrepreneurship climate. This application area provides the knowledge, understanding, and skills to create, organize, and manage new ventures or small- to medium-sized and emerging growth businesses as independent entities, or within corporate structures.

Students examine theory and research, but the fundamental thrust of this application area is to experience entrepreneurial cultures through professional experiences such as field projects, meeting entrepreneurs in the classroom, internships, writing feasibility and business plans, and developing other practical skills.

After completing the required lower-division core courses, students may begin the study of entrepreneurial environments in their junior year. Entrepreneurial finance, business plan preparation, and an internship may be taken in the junior and/or senior year.

Students who complete the three required entrepreneurship courses with a 3.300 GPA or better, and who complete an approved 60-hour internship, will qualify to sit for the entrepreneurship honors oral exam. Those who pass the exam will be awarded the Certificate of Excellence in Entrepreneurial Studies.

<i>Required Courses</i>	<i>Semester Hours</i>
ESBM 3700 Entrepreneurial Environments . . . . .	3
ESBM 4570 Entrepreneurial Finance . . . . .	3
ESBM 4830 Business Plan Preparation . . . . .	3

*Note: Students seeking internships should have completed ESBM 3700 by the end of their junior year.*

## International Business

The globalization of the marketplace has created a need for managers who can function effectively in the international business environment. Despite this movement toward globalization, there remains significant environmental differences (cultural, economic, and political) between countries and/or regions. Managers in an international business must be sensitive to these differences and also must adopt the appropriate policies and strategies for dealing with them.

To address these issues, the Leeds School of Business offers an area of application in international business. In addition to this area of application, students can complete additional requirements that result in an international business certificate. The area of application and certificate program build on the student's understanding of the functional areas of business and provide her or him with an appreciation of the international environment and a framework for developing policies and strategies appropriate for this environment.

<i>Required Courses</i>	<i>Semester Hours</i>
INBU 4200 International Financial Management . . . . .	3
INBU 4300 International Business Management . . . . .	3
MKTG 3400 International Marketing . . . . .	3

In addition, the certificate program requires completion of the following:

1. Six hours of economics, geography, or political science beyond arts and sciences course requirements. Courses must be selected from an approved list (students should see the advising office for details).
2. Three hours of foreign language beyond MAPS requirements.
3. Six hours of an international experience. This requirement can be satisfied through either study abroad programs or academic internships of an international business nature.

Finally, it is recommended that students in the international business area of application or the certificate program consider additional electives from the following courses: MGMT 4070 International Operations Management and ACCT 4700 International Accounting.

## Real Estate

The real estate area of application is designed to provide students with exposure to the concepts, tools, and techniques necessary for entry-level positions. A career in real estate provides an opportunity for individuals to operate as entrepreneurs whether they are brokers, appraisers, developers, property managers, consultants, or investors. An integrated process is followed in the three application area courses to prepare students for real estate careers.

### Area of Application

<i>Required Courses</i>	<i>Semester Hours</i>
REAL 3000 Principles of Real Estate Practice . . . . .	3
REAL 4000 Real Estate Law and Financing Instruments . . . . .	3
REAL 4100 Real Estate Finance and Investment Analysis . . . . .	3

The real estate certificate program allows students to broaden their knowledge and understanding of real estate through a multidisciplinary focus, whereby courses are taken outside of the Leeds School of Business. For this program, students must com-

plete the courses listed above (REAL 3000, 4000, and 4100), 9 credits of nonbusiness electives listed below, and an academic internship. See the Real Estate center for a list of the approved electives and internships.

### Certificate

<i>Required Courses</i>	<i>Semester Hours</i>
Area of application courses listed above . . . . .	9
College of Architecture and Planning courses . . . . .	6
Construction management course in the Department of Civil, Environmental, and Architectural Engineering . . . . .	3
Academic internship in real estate practice or related area . . . . .	3

## Graduate Degree Programs

The Leeds School of Business offers programs leading to the master of business administration (MBA), master of science (MS) emphasis in accounting, and doctor of philosophy in business administration (PhD) degrees. The Leeds School also offers a part-time MBA program called the Evening MBA that leads to the same degree as the full-time MBA program. Dual degree options available in the MBA program include juris doctor/master of business administration (JD/MBA), master of business administration/master of arts (MBA/MA) in fine arts, master of business administration/master of arts (MBA/MA) in anthropology, master of business administration/master of arts (MBA/MA) in Germanic and Slavic Languages, master of business administration/master of arts (MBA/MA) in theatre and dance, master of business administration/master of science (MBA/MS) in environmental studies, master of business administration/master of science (MBA/MS) in computer science, master of business administration/master of science (MBA/MS TLEN) in telecommunications. Dual degree options are not available in the Evening MBA program.

These programs are open to qualified individuals who hold a bachelor's degree from a regionally accredited college or university, or a recognized international university, without regard to their undergraduate major. The Leeds School of Business also offers a concurrent BS/MS program in accounting that awards the bachelor's and master's degrees simultaneously.

### Master of Business Administration

The breadth of training that master of business administration graduates receive prepares them to become high-level managers or become involved in new business ventures in a challenging and evolving business environment.

The MBA program is rigorous and comprehensive, and demands student commitment. The core curriculum provides a set of broad-based, integrative skills, rather than narrowly focused, highly specialized skills. Core courses provide a solid foundation in both business management and analytical disciplines, a foundation that fosters continued career growth. In addition to core courses stressing key functional areas of business, students can choose electives specific to their chosen area of concentration.

The case study method and student field projects are used broadly throughout all courses, and common areas of study such as ethics, technology, communications, and international issues are integrated throughout much of the curriculum. Students learn about management theory and its practical applications in "real-world" situations. Lectures, seminars, team teaching, team projects, and guest lectures are various approaches taken by the faculty to generate new ideas and encourage student input.

### Requirements for Admission to MBA Programs

For all MBA programs, the admissions committee reviews the applicant's complete application, with consideration given to the following:

- An applicant's academic record.
- An applicant's score on the Graduate Management Admission Test (GMAT). The GMAT must be retaken if the test date was more than five years ago.
- International students must provide a TOEFL exam score.
- An applicant's work experience.
- Written essays.
- Personal interviews.
- Letters of recommendation.

In addition, a nonrefundable application fee is required of all applicants. See the specific MBA application for more information. The online application is on the MBA program website at [mbaep.colorado.edu/fulltime/index.html](http://mbaep.colorado.edu/fulltime/index.html).

The mailing address for additional materials is Leeds School of Business, University of Colorado at Boulder, 419 UCB, Boulder, CO 80309-0419, or call 303-492-8397.

### Diversity

The Leeds School of Business encourages qualified individuals to apply regardless of sex, race, religion, national origin, age, or physical limitation.

### MBA Policies and Requirements

For current, detailed information regarding the MBA program, contact the Leeds School of Business.

**Advising.** All graduate students are required to check in with an advisor during the first semester of study to ascertain degree requirements. MBA students should check in with the student services manager for the MBA program.

**Minimum Hours Required.** Students entering the MBA program take a prescribed sequence of classes before beginning elective courses. A minimum of 55 credit hours is needed to graduate. Students entering the MBA program must complete the degree in two years. Transferred course work is not accepted into the MBA program.

**Core Course Waiver.** Students may not waive core courses.

**Courses Taken Outside the Leeds School of Business (limits).** MBA students may enroll in up to 12 hours of elective course work outside the Leeds School of Business provided the remaining 15 hours of electives are taken within the MBA program with approval from the MBA programs office. Course work taken outside the Leeds School of Business must be at the graduate program level. Students may not take courses outside the University of Colorado at Boulder and count them toward the degree. Students should contact individual departments for course listings and registration requirements for nonbusiness courses.

**Grades and Quality of Work.** All courses applied toward the 55 credit hours must be taken for a grade. Courses in which a C- or below is received are not accepted for credit toward the 55 credit hours and may have to be retaken. In this case, both grades are factored into the GPA. To withdraw from an elective course and receive a grade of W, a student must be earning a passing grade in that course. Students normally are not permitted to withdraw from courses after the sixth week of the semester. Students in the MBA program may not withdraw from specified, lock-step course work. An *IF* is an incomplete grade. Use of the *IF* is at the discre-

tion of the course instructor and/or the dean. Students must ask for an incomplete grade. An *IF* is given only when students, for reasons beyond their control, have been unable to complete course requirements. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given.

**Calculating GPAs.** For the purpose of calculating GPAs for MBA student rankings and probation, only course work taken within the business school is counted.

**Withdrawal.** Students who choose to leave the program must formally withdraw. Failure to do so will result in assessment of full tuition and fees. Students who withdraw must reapply to the program if they wish to continue their studies. Applicants who reapply are evaluated with current applicants to the program. Students who are granted re-admission must complete the requirements of the current program. Course work taken more than five years earlier must be validated by examination in order to count toward the degree and may be considered elective credit.

**Probation.** A student whose cumulative GPA falls between a 2.500 and 3.000 is placed on academic probation. The student is allowed to remain on probation for one semester as long as reasonable progress is made to improve the GPA. The MBA director for academic programs determines whether reasonable progress is being made and whether the student can graduate with a 3.000 in the stated time limit.

**Suspension.** A student whose cumulative GPA falls below 2.500 at any time is automatically suspended from the program. A suspended student is eligible to reapply after one year. Note that applicants who reapply are evaluated against other applicants applying for consideration that year.

### Juris Doctor/Master of Business Administration Degree

The purpose of this dual-degree program is to allow students admitted to both the School of Law and the Leeds School of Business to obtain the juris doctor (JD) and the master of business administration (MBA) degrees in four (or fewer) years of full-time study. The program is designed to train students for careers in which business administration and law overlap.

### Admission

To be eligible for the JD/MBA dual-degree program of the School of Law and the Leeds School of Business, a student must apply separately to and be admitted by each of the two schools under their respective admission procedures and standards.

Students may elect the dual-degree program at the time of initial application to both schools, or they may apply for the dual-degree program during their first year of study in the degree program of either school.

### Course of Study

A student enrolled in the JD/MBA program may commence studies under the program in either the School of Law or the Leeds School of Business. Dual-degree students are strongly encouraged to begin their course of study at the School of Law. However, a student must take the first year of the JD curriculum as a unit exclusively in the School of Law. Likewise, a student must take the first year of the MBA curriculum as a unit exclusively in the Leeds School of Business. Students can then take additional courses necessary to meet the requirements of the degree programs of the two schools.

No student in the dual-degree program shall be allowed to take fewer than 9 semester hours or more than 16 semester



hours during any term (excluding summer terms) without receiving the consent of the program advisor in each school in which courses are being taken.

#### ***Credit for Law Courses in the JD/MBA Program***

The Leeds School of Business grants credit toward the MBA degree for up to 12 semester hours of acceptable performance in law courses taken by a JD/MBA student at the School of Law. Core courses required in the law school program cannot be counted toward the 12 hours. A student must earn at least a 77 grade in a law school course to be accepted for Leeds School of Business credit. For credit to be granted, the law school courses must be approved before enrollment by an MBA advisor. Only courses taken after admission into the MBA program are credited toward the degree.

#### ***Grading in the Dual-Degree Program***

Leeds School of Business credit for courses completed in the School of Law as part of the joint degree program is recorded on a *pass/fail* basis and is not included in the required MBA 3.00 cumulative average.

#### **Master of Business Administration/ Master of Science—Telecommunications**

The Leeds School of Business, in conjunction with the College of Engineering and Applied Science, offers a dual-degree program resulting in a master of business administration (MBA) and master of science in telecommunications (MS/TLEN). The dual-degree program combines broad-based business management study with an in-depth understanding of telecommunications technology. This program prepares students to be competent, effective managers in the telecommunications industry.

#### ***Admission***

An individual must apply separately and be admitted to both programs under each school's or college's admission procedures and standards. Applicants are encouraged to apply to the programs concurrently.

#### ***Course of Study***

Students in the MBA/MS in telecommunications spend the first year of the dual-degree program exclusively in either the business school or the telecommunications program. In the second year, courses are taken exclusively in the other department. In the third year students will take both MBA and telecommunications elective courses to complete both master's degrees.

#### ***Credit for Courses***

Dual degree students are required to complete 43 hours of MBA course work and 36 hours of telecommunications course work. A minimum of 79 approved credits must be completed to earn both degrees.

#### **Master of Business Administration/ Master of Fine Arts**

The Leeds School of Business, in conjunction with the Department of Art and Art History, offers students the ability to earn an MBA and an MA in fine arts through a three-year dual-degree program. Students in the MBA/MA dual-degree program pursue careers in digital marketing, web design, e-commerce, gallery/museum administration, and private art consulting.

#### ***Admission***

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

#### ***Course of Study***

Students in the MBA/MA in fine arts spend the first year of their dual-degree program exclusively in either the business school or the fine arts program. In the second year, courses are taken exclusively in the other department. The third year offers students the opportunity to take both MBA and fine arts elective courses.

#### ***Credit for Fine Arts Courses in the MBA/MA Fine Arts Program***

Dual-degree students in studio arts are required to complete 43 hours of MBA course work and 45 hours of fine arts course work. Dual-degree students in art history are required to complete 43 hours of MBA course work and 30 hours of fine arts course work.

#### **Master of Business Administration/ Master of Arts Theater and Dance**

The Leeds School of Business, in conjunction with the Department of Theatre and Dance, offers students the ability to earn an MBA and an MA in theatre or dance through a three-year dual-degree program. Students in the MBA/MA dual-degree program pursue careers in a wide variety of fields and jobs in the world of the performing arts. Types of organizations include theatre companies, dance companies, opera companies, symphonies, arts councils, performing arts complexes, civic auditoriums, and arts presenters.

#### ***Admission***

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

#### ***Course of Study***

Students in the MBA/MA in theatre and dance spend the first year of their dual-degree program exclusively in either the business school or the theatre/dance program. In the second year, courses are taken exclusively in the other department. The third year offers students the opportunity to take both MBA and theatre/dance elective courses.

#### ***Credit for Courses***

Dual degree students are required to complete 43 hours of MBA course work and 24 hours of theatre/dance course work. A minimum of 67 approved credits must be completed to earn both degrees.

#### **Master of Business Administration/ Master of Environmental Studies**

The MBA/MS in environmental studies enables students to earn an MBA and an MS in environmental studies over three or four years. Students in the MBA/MA program have career interests that combine corporate business and environmental protection,

the management of renewal energy, water conservation, or environmental programs.

### *Admission*

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### *Course of Study*

Students in the MBA/MS in environmental studies spend the first year of the dual-degree program exclusively in either the business school or the environmental studies department. In the second year, courses are taken exclusively in the other department. The remaining year(s) students may take both MBA and environmental studies electives.

### **Master of Business Administration/ Master of Computer Science**

The MBA/MS in computer science enables students to earn an MBA and an MS in computer science over three or four years. Students in this MBA/MS program have career interests that combine corporate business and technology.

### *Admission*

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### *Course of Study*

Students in the MBA/MS in computer science spend the first year of the dual-degree program exclusively in either the business school or the computer science department. In the second year, courses are taken exclusively in the other department. The remaining year(s) students may take both MBA and computer science electives.

### **Master of Business Administration/Master of Anthropology**

The MBA/MA in anthropology dual-degree program enables students to earn an MBA and an MA in anthropology simultaneously over three or four years depending on the student's sub-discipline in anthropology. Students in this MBA/MA program pursue careers in managing the business aspects of archaeological projects, working in the growing field of corporate cultural anthropology, and ethnography or museum management.

### *Admission*

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### *Course of Study*

Students in the MBA/MA in anthropology spend the first year of their dual-degree program exclusively in either the business school or the department of anthropology. In the second year, courses are taken exclusively in the other department. The re-

maining year(s) offers students the opportunity to take both MBA and anthropology elective courses.

### **Master of Business Administration/ Master of Germanic and Slavic Languages**

The MBA/MA in Germanic and Slavic languages dual-degree program enables students to earn an MBA and an MA in Germanic and Slavic languages simultaneously over three or four years. Students in this MBA/MA program pursue careers in international business.

### *Admission*

Applicants must apply to both programs and must meet the application requirements for each program separately. Students may apply simultaneously to both programs or may apply to the second program after starting the first master's program, provided they do so during the first year of study.

### *Course of Study*

Students in the MBA/MA in Germanic and Slavic languages spend the first year of their dual-degree program exclusively in either the business school or the department of Germanic and Slavic languages. In the second year, courses are taken exclusively in the other department. The remaining year(s) offers students the opportunity to take both MBA and Germanic and Slavic languages elective courses.

### **Master of Science in Business Administration**

There are two paths to the master of science in business administration (MS) degree with an emphasis in accounting or taxation. The first is the concurrent bachelor's and master's degree program. In this program, both the bachelor's and master's degrees are awarded following the completion of 150 specified hours of course credit. An academic internship is an option within this requirement. The program is designed for students pursuing the 150-hour educational background requirement for CPAs (required by most states) and is a highly integrated and challenging program of study. Upon completion of 90 credit hours, undergraduate students in the Leeds School of Business may apply to the program and begin taking graduate courses and an internship during their senior year. This program provides an excellent foundation for careers in professional accounting.

The second path is an independent master's degree program. Students with undergraduate degrees other than accounting or business may also be admitted to the program, but may have to fulfill deficiency requirements in addition to the regular program requirements. Students with business deficiencies may want to consider the MBA program instead.

All students in these programs choose an area of study that focuses on financial accounting or taxation.

Note that MS students are required to complete all degree requirements within four years. Graduate students are not given preferential enrollment in undergraduate courses needed for the deficiency requirements.

### *Minimum Requirements*

Accounting and taxation students must complete a minimum of 30 semester hours of graduate-level work. The newly accepted MS student should consult with the faculty advisor for the program to develop an individualized degree plan. No thesis is required.

Students in the Master of Science in Business Administration programs are governed by the rules of the Graduate School. See that section of the catalog.

### ***Emphasis in Accounting***

The expanding role and increased breadth of knowledge expected of accountants make graduate study in accounting highly desirable. Courses offered for the accounting area of emphasis prepare students for high-level, professional careers in the field. The graduate program in accounting is designed to provide a broad understanding of accounting issues as well as to enhance an undergraduate degree in accounting. It also provides the opportunity to develop knowledge in a related minor area, such as economics, finance, information systems, management, marketing, taxation, or telecommunications. Note that these supporting fields may require some undergraduate level course work beyond core requirements.

### ***Emphasis in Taxation***

The master of science in business administration that emphasizes taxation integrates accounting and law school courses. Some of the tax and law courses are strictly tax-related while others include related legal aspects of a particular subject area. The combination of courses is designed to give exposure to taxation from the accounting and law faculty perspectives.

The purpose of this program is to prepare students for professional careers as Certified Public Accountants (CPAs) specialized in taxation. Therefore, the focus of the program is to train students to:

- develop a refined ability to recognize tax problems and understand tax issues in a broad economic framework;
- research and present well-developed strategies or solutions to tax problems; and
- develop creative tax planning opportunities in a variety of contexts.

## **Doctor of Philosophy in Business Administration**

A PhD degree recognizes scholarly achievement and is the highest academic honor that CU-Boulder bestows. The PhD in business administration prepares scholars to be preeminent in their field of expertise. The program focuses on developing the necessary skills for the design and execution of original, innovative research and for the dissemination of knowledge through teaching and writing.

### ***Requirements for Admission***

To preserve the individualized character of the PhD program and its quality, the number of students is limited and the application process is very competitive. Students are admitted for study in a specific area for doctoral work. The Leeds School of Business currently offers the following areas of study: accounting; finance; marketing; information management; operations management; and strategic, organizational, and entrepreneurial studies.

For more information on the application requirements and process, write Leeds School of Business, PhD Program, University of Colorado at Boulder, 419 UCB, Boulder, CO 80309-0419; call 303-492-4984; or visit [leeds.colorado.edu/phdprogram](http://leeds.colorado.edu/phdprogram).

### ***Background, Prerequisites, and Deficiencies***

Each student must have a background in mathematics at or beyond calculus. Based on experience, background, and at the

discretion of the academic advisor and/or division chair and/or the doctoral program director, additional prerequisites may be required of the PhD student.

### ***Requirements for the Degree***

Most curriculum and program requirements are decided by the division. Consult the PhD program advisor or the appropriate division for information regarding course selection, graduate teaching program certification, research internships, and other division requirements. Students must complete all Graduate School, Leeds School of Business, and division requirements to be conferred the PhD in business administration.

The newly accepted PhD student should consult with the division chair and/or academic advisor to develop an individualized degree plan. Students are required to become proficient in their primary area of study. In addition, all students are required to complete course work in a field outside their division. These “second fields” are governed by the departments offering the course work but typically require 6 to 12 credit hours. The second field may also require an additional comprehensive exam.

### ***Course Work***

All doctoral students are required to complete at least 30 hours of course work and 30 hours of dissertation credit at CU-Boulder. Additional course work may be required as determined by the academic advisor. To comply with this 30-hour requirement, a course must have been taught by a member of the university’s graduate faculty, must be at the 5000 level or above, and the student must achieve a grade of B- or better.

Courses must be approved by the student’s academic advisor before registration. Most students are required to complete 7000- and 8000-level doctoral seminars.

For full-time status, the Leeds School of Business requires successful completion of 5 credit hours of course work each semester. During and after comprehensive exams, full-time status requires completion of a minimum of 5 dissertation hours each semester.

### ***Transfer of Credit***

A maximum of 9 semester hours of courses taken at other schools (this includes other University of Colorado campuses) or taken as a special student at the university may be transferred into the doctoral program. Course work must be recent and of doctoral-level quality. A doctoral student must establish a satisfactory record of residence in the doctoral program before the course work is eligible for transfer. The transfer of credit must be approved by the division, the doctoral program director, and the Graduate School. There is no guarantee any course work will be accepted for transfer.

### ***Residency***

The Leeds School of Business adheres to the Graduate School rules regarding residency. All students in the doctoral program are expected to be full-time students on the Boulder campus (at least during residency and prior to completing the comprehensive examinations). Doctoral students are expected to be available to participate in colloquia and other informal academic discussions. Full-time employment outside the university is prohibited during the residency period. Any off-campus status must be approved by the division and the doctoral program director.

### *Time Limit*

Doctoral students have six years from the commencement of course work to complete all requirements of the degree, but most students complete their program within five years.

### *Comprehensive Examination*

Before admission to candidacy, a doctoral student must pass a comprehensive examination in the field of concentration. The examination may be oral, written, or both, and will test the student's mastery of a broad field of knowledge, not merely the formal course work completed. Each division will determine the required content, length, and standards of evaluation for the exam. Check with the division as to the specific requirements for the comprehensive exam.

### *Admission to Candidacy*

Students are admitted to candidacy according to Graduate School procedures and requirements. Students shall complete all course work and any other requirements listed on their degree plans, earn at least four semesters of residence, and successfully pass the comprehensive exams before admission to candidacy is approved by the Graduate School. In addition, requirements related to academic quality of work, graduate-level course work, the minimum number of course hours, and graduate faculty membership must be met before admission to candidacy is approved.

### *Dissertation*

A dissertation based upon original investigation showing mature scholarship and critical judgment, as well as competence with research tools and methods, must be written on a subject approved by the candidate's dissertation committee. To be acceptable, the dissertation must be a significant contribution to knowledge in the candidate's primary field.

### *Final Examination (Defense)*

Upon recommendation of the candidate's doctoral dissertation committee, a final oral examination shall be given. This examination covers both the dissertation and the primary field of study. The oral examination is open to the public.

### *Filing the Dissertation*

The dissertation must comply in mechanical features with the University of Colorado Graduate School Thesis and Dissertation Specifications. The dissertation must be filed with the Graduate School by the posted deadline for the semester in which the degree is to be conferred.

## **Faculty— Leeds School of Business**

MANUEL LAGUNA, interim dean of the Leeds School of Business; associate dean for faculty; professor of operations management. BS, Monterrey Technologie at Queretaro, Mexico; MS, PhD, University of Texas at Austin.

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WILLIAM BAUGHN, professor of finance emeritus.

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CHRIS YUNG, assistant professor of finance. BS, Ohio State University; MA, University of Kentucky; PhD, Washington University at St. Louis.

JAIME ZENDER, professor of finance. BA, University of Colorado; MA, MPhil, PhD, Yale University.

# School of Education

*Lorrie A. Shepard, dean*

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**T**HE SCHOOL OF EDUCATION provides teacher licensure programs that ensure rigorous content preparation and extensive field-based practicum experiences. Its graduate programs emphasize research that focuses on educational policy and practice.

## Accreditation

The licensure programs, both undergraduate and graduate, are fully accredited by the North Central Association of Colleges and Schools, the National Council for Accreditation of Teacher Education, the Colorado Department of Education, and the Colorado Commission on Higher Education.

## Mission

The mission of the School of Education includes several interconnected elements. Faculty conduct research to improve educational policies and classroom practice, prepare researchers at the doctoral level, educate teachers at the undergraduate and master's levels in high quality programs, and provide exceptional outreach services to our partner school districts and Colorado. The School of Education has adopted the following priorities:

- to promote the distinctive identity of the school by building on the already visible contributions of individual faculty members and by emphasizing our shared commitment to evidence-based policy and practice and to democracy, diversity, and social justice;
- to produce research that makes a difference by bringing rigorous research methods and analytic tools to bear in addressing the most pressing questions affecting educational policy and practice;
- to prepare teachers who display a passionate commitment to ensuring every student learns, who embrace and demonstrate ethical behaviors and democratic dispositions, and who excel in their knowledge of subject matter, how people learn, the socio-cultural world of learners, standards-based curriculum design, learner-centered pedagogies and assessments, and the democratic context of schools;
- to prepare graduate candidates who are well-trained in research methodology, expert in their area of specialization, and broadly knowledgeable about psychological, sociological, philosophical, and historical research affecting education;
- to encourage candidates of color into teaching and research professions through recruitment and support; and
- to enhance the effectiveness of our partnership and outreach activities by fostering closer connections among teaching, research, and outreach commitments.



## Programs of Special Interest

### Student Organizations

The Student Association of Graduate Education (SAGE) sponsors special events for graduate students. Its officers are selected in the fall. Phi Delta Kappa is the honorary society within the School of Education.

### Educational Diversity Scholars Program

The Education Diversity Scholars (EDS) program works with the University of Colorado's LEAD Alliance Neighborhood to provide students of color and first-generation college students with social and academic support, as well as advising on financial support and career preparation. The goal of the program is to offer students a welcoming environment and a strong support network in order to help them excel in their chosen fields. By participating in the Diversity Scholars neighborhood, students have access to the personal contact and support of a small community while still being able to take advantage of the benefits of a large university.

### CU Teach

The CU Teach program is a four-year degree/licensure program that allows students to complete a rigorous education in a mathematics or science major and fulfill the requirements for a Colorado initial teaching license in Secondary Mathematics or Secondary Science. It is a unique collaborative program between the College of Arts and Sciences and the School of Education. CU Teach prepares outstanding secondary mathematics and science teachers ready to teach right after earning a bachelor's degree. CU Teach students get immediate hands-on K-12 teaching experience by enrolling in the first course of the CU Teach program: Step 1 (EDUC 2020). Students can enroll in the Step 1 course as early as their freshmen year at CU. In addition to taking courses from research faculty in the School of Education and the College of Arts and Sciences, CU Teach students get support from experienced Mentor Teachers (current K-12 teachers) and Master Teachers (CU faculty who are veteran 6th-12th grade teachers). WE-Teach is the program's student organization.

## Academic Excellence

### Scholarships and Awards

A limited number of scholarships and awards are available for second- and third-year candidates within the School of Education to support study at the master's and undergraduate levels. Each year a combination of teaching assistantships (TAs), research assistantships (RAs), other forms of graduate assistantships (GAs), and fellowships are available in the School of Education

to support full-time doctoral study. The strongest doctoral applicants are nominated by the school for fellowships awarded by the Graduate School. Candidates apply in the spring semester for scholarships and awards for the following school year. Application procedures and deadlines are publicized. All materials are turned into the Office of Student Services (Education 151).

Students are eligible to apply for university-wide financial assistance through the Office of Financial Aid. State and federal programs are available for loan cancellation or forgiveness for Colorado teachers of certain subjects or who teach in designated schools serving students from low-income families. Information about these opportunities may be found at [www.colorado.edu/education/students/financialaid.html](http://www.colorado.edu/education/students/financialaid.html).

## Academic Standards

Upon enrollment in the Teacher Education Program, a student who fails to maintain a 2.75 GPA (3.00 for graduate students) will be placed on probation or may be suspended. Readmission is subject to program requirements in effect at the time of reapplication. The same conditions apply to students in other colleges and schools who have been admitted to the teacher education program.

## Teacher Licensure Programs

The School of Education offers course work leading to initial Colorado licensure to undergraduate, postbaccalaureate, and master's degree students. Colorado requires public school teachers to be licensed by its state department of education. Students who successfully complete all School of Education requirements will be recommended for a Colorado provisional (initial) teaching license, the license issued to all new teachers in Colorado. Licensure requirements vary from state to state and from teaching area to area. Students who are interested in teaching in other states should familiarize themselves with the requirements of those states so they may plan an appropriate degree program.

### Undergraduate and Postbaccalaureate (Nonmaster's Degree) Licensure Programs

Elementary (grades K–6) education

Secondary education (grades 7–12) fields:

- English
- World language (French, German, Japanese, Latin, Russian, or Spanish)
- Mathematics
- Science
- Social studies

Music (grades K–12)

### Secondary Master's Degree Plus Licensure Program

(see Graduate Study section for additional program information)

Secondary education (grades 7–12) fields:

- English
- Mathematics
- Science
- Social studies

## Program Goals

Teacher education programs focus on the preparation of novice teachers in three interdependent areas:

- knowledge of subject matter and pedagogy,
- education of students in a diverse society, and
- professional obligations and dispositions of teachers in a democracy.

To meet these goals teacher education students engage in a planned sequence of courses and accompanying field experiences in community and school sites.

## Performance-Based Standards for Colorado Teachers

In addition to program goals, the teacher education programs address eight performance-based standards for Colorado teachers, as adopted by the Colorado Department of Education in January 2000.

1. **Knowledge of Literacy.** The teacher shall be knowledgeable about student literacy development in reading, writing, speaking, viewing, and listening.
2. **Knowledge of Mathematics.** The teacher shall be knowledgeable about mathematics and mathematics instruction.
3. **Knowledge of Standards and Assessment.** The teacher shall be knowledgeable about strategies, planning practices, assessment techniques, and appropriate accommodations to ensure student learning in a standards-based curriculum.
4. **Knowledge of Content.** The elementary teacher is knowledgeable, in addition to literacy and mathematics, in the following content areas: civics, economics, foreign language, geography, history, science, music, visual arts, and physical education. Middle school and secondary content teachers shall be knowledgeable in literacy and mathematics and expert in their content endorsement area(s).
5. **Knowledge of Classroom and Instruction Management.** The teacher is knowledgeable about classroom practice in order to successfully manage time, communications, and record keeping procedures that will support and enhance student learning.
6. **Knowledge of Individualization of Instruction.** The teacher is responsive to the needs and experiences children bring to the classroom, including those based on culture, community, ethnicity, economics, linguistics, and innate learning abilities. The teacher is knowledgeable about learning exceptionalities and conditions that affect the rate and extent of student learning, and is able to adapt instruction for all learners.
7. **Knowledge of Technology.** The teacher is skilled in technology and is knowledgeable about using technology to support instruction and enhance student learning.
8. **Democracy, Educational Governance, and Careers in Teaching.** The teacher recognizes the school's role in teaching and perpetuating our democratic system. The teacher knows the relationships among the various governmental entities that create laws, rules, regulations, and policies that determine educational practices.

The objectives of the university relative to teacher education are the following:

1. Provide programs of undergraduate and graduate studies designed to develop outstanding teachers, supervisors, college teachers, administrators, and researchers.
2. Conduct and direct educational research and to engage in writing and related creative endeavors.
3. Identify and attract future outstanding teachers into the teacher education program.
4. Cooperate with other state, regional, and federal agencies to improve educational programs.

Teacher education at the University of Colorado, while administered by the School of Education, is a university-wide function. Many academic departments provide course work that supports the teacher in training. Undergraduate students follow a prescribed set of arts and sciences core courses that meet state content preparation standards, complete a major, and satisfy professional education requirements concurrently. The program involves a combination of courses at the university and K–12 school placements.

## Academic Majors

**Undergraduate Students.** Undergraduate students enrolled at the University of Colorado at Boulder seeking both a bachelor's degree and teacher licensure must complete a major approved for prospective teachers by the Colorado Department of Higher Education. With careful planning beginning freshman year, these programs may be completed in four years. A list of these approved majors may be obtained from College of Arts and Sciences advisors or the Office of Student Services, Education 151. No professional education course work taken before the implementation of the Colorado Model Content Standards and Performance-Based Standards for Colorado Teachers may count for teacher education requirements.

The major selected is determined by the student's interest in teaching a certain subject or instructional level. Before selecting a particular major, students may see the School of Education advisor. Students interested in teaching at the secondary level should be aware that in many subject areas the teaching program requires additional courses or more hours than the academic major. Course requirements for all programs are explained in the program checklists available in Education 151.

## Arts and Sciences Core Requirements for Teacher Candidates

Arts and sciences students must complete college core curriculum requirements (see College of Arts and Sciences Undergraduate Degree Requirements section). Teacher licensure students must take specified courses within some categories of this core curriculum.

The arts and sciences core is listed below; courses specified in each area for students seeking teaching licensure are in **bold italic** type.

### Elementary Licensure

Foreign Language: Third semester proficiency in a single modern or classical foreign language.

Quantitative Reasoning and Mathematical Skills: 3–6 semester hours.

**MATH 1110 and 1120 Spirit and Uses of Mathematics 1 and 2 or MATH 1300 Calculus 1**

Written Communication: 3 lower-division and 3 upper-division semester hours.

Critical Thinking: 3 upper-division semester hours.

Historical Context: 3 semester hours.

**HIST 1010 Western Civilization 1 or HIST 1020 Western Civilization 2**

Human Diversity: 3 semester hours.

**EDUC 3013 School and Society**

United States Context: 3 semester hours.

**HIST 1015 History of the United States to 1865 or HIST 1025**

**History of the United States since 1865**

Natural Science: 13 semester hours, including a 2-course sequence and a laboratory or field experience.

**Physical science required (ASTR, ATOC, CHEM, GEOG, GEOL, PHYS)**

**Biological science required (EBIO, MCDB, or IPHY 3420)**

Contemporary Societies: 3 semester hours.

**PSCI 1101 American Political Systems**

Ideals and Values: 3 semester hours.

**Additional liberal arts requirement:**

**Human/Cultural Geography: 3 semester hours**

### Secondary Licensure

Foreign Language: Third semester proficiency in a single modern or classical foreign language.

Quantitative Reasoning and Mathematical Skills: 3–6 semester hours.

**MATH 1410 Mathematics for Secondary Teachers or MATH 1300 Calculus 1**

Written Communication: 3 lower-division and 3 upper-division semester hours.

Critical Thinking: 3 upper-division semester hours.

Historical Context: 3 semester hours.

Human Diversity: 3 semester hours.

**Course from major or EDUC 3013 School and Society**

United States Context: 3 semester hours.

Literature and the Arts: 6 semester hours, 3 upper-division semester hours.

Natural Science: 13 semester hours, including a 2-course sequence and a laboratory or field experience.

Contemporary Societies: 3 semester hours.

**Course from major or EDUC 3013 School and Society**

Ideals and Values: 3 semester hours.

**Postbaccalaureate Students.** Postbaccalaureate students are not required to have a degree in one of the majors approved by the Colorado Department of Higher Education. *However, students who have graduated with a nonapproved major often must take additional arts and sciences and major course work to fulfill state teacher licensure requirements.*

## Admission

Admission to all School of Education programs is selective. Satisfying minimal admission criteria does not guarantee admission.

### Students Entering or Currently Enrolled at the University of Colorado

Undergraduate students seeking to complete the School of Education teacher education program must be enrolled in an approved degree program in one of the colleges or schools of the university. All undergraduates interested in teaching may seek teacher education advising at the time they enter the university. Freshman and sophomore students are encouraged to satisfy as many of the arts and sciences core requirements, liberal arts requirements for the appropriate licensure program, and major field requirements as possible before applying for admission to the teacher education program. Some education courses may be taken prior to admission to the teacher education program. Students should pick up advising materials in Education 151 and attend all education information sessions, including freshman orientation.

### Transfer Students

Undergraduate students who seek to transfer to the University of Colorado from another accredited institution must apply for admission through the Office of Admissions. They must enroll in a degree program in one of the undergraduate degree-granting colleges or schools of the university and also apply for admission to the teacher education program in the School of Education. At least 30 hours of course work for licensure must be taken while the student is officially enrolled as a student in the university. Credit in student teaching will not transfer to the University of Colorado at Boulder. Please see Undergraduate Admission in the General Information section for specific requirements.



### Former Students

Former students who have not completed an undergraduate degree may reenter the university according to general university policies; however, subsequent to that readmission, they must apply separately for entry into the teacher education program. Undergraduate students who anticipate that they will graduate prior to completing the teacher education program must see the School of Education advisor. All admitted students who remain continuously enrolled will be expected to complete the program in effect at the time of their admission to the program unless state accrediting changes dictate otherwise.

### Postbaccalaureate and Master's Degree Students Seeking Teacher Training

Students who already hold a bachelor's degree and wish to pursue licensure should apply directly to the School of Education. Students desiring institutional recommendation for licensure must complete at least 30 semester hours of work at the University of Colorado and also must fulfill the same academic area requirements as undergraduate students. The actual number of required hours will depend on courses already completed.

### Application Requirements

Students may apply to one of the teacher education programs if the following requirements have been fulfilled:

- 1. GPA.** Elementary and secondary students must have and maintain a 2.75 (on a 4.00 scale) cumulative GPA, 2.75 at CU-Boulder, 2.75 in their subject area (secondary teacher fields), and 2.75 in education. Music students must have and maintain a 3.00 overall and in their subject area. Students applying to Master's Plus (MA+) programs must have and maintain a 3.00 cumulative GPA.
- 2. Prior Degrees.** Students applying to Postbaccalaureate and Master's Plus (MA+) programs must have a bachelor's degree from an accredited institution.
- 3. Youth Experience.** Students must provide written verification of 25 clock hours of satisfactory experiences with elementary, middle/junior high, or senior high school-aged youth (appropriate to the desired program) in the past five years. Forms for this purpose are available in the Office of Student Services, Education 151, or online at [www.colorado.edu/education/prospective/teachereducation.html](http://www.colorado.edu/education/prospective/teachereducation.html). Students in the CU Teach program meet this requirement through school experiences in Step 1 and 2 courses.
- 4. Basic Skills.** All teacher education students must demonstrate basic skills competence in mathematics and literacy. This may be done through acceptable grades in appropriate college course work, or by acceptable standardized test scores. Contact the Office of Student Services in Education 151 for more information.
- 5. Letters of Recommendation.** See the Application Materials section.
- 6. Personal Statement.** See the Application Materials section.
- 7. Fee.** The appropriate application fee should be submitted with application materials. Fees vary by program.
- 8. Deadlines.** Deadlines for undergraduate and postbaccalaureate admission are February 1 for fall and September 15 for spring. The deadline for MA+ is January 1.

### Application Materials

Individuals interested in completing the teacher education program at the University of Colorado at Boulder should request application materials from the Office of Student Services, Education 151 or online at [www.colorado.edu/education/prospective](http://www.colorado.edu/education/prospective). Students currently enrolled in a degree program at Boulder will need to complete an application and submit official transcripts from all previous colleges to the Office of Student Services, Education 151. Transcripts must be mailed directly to the School of Education from the previous college to be considered official.

Individuals who have completed a baccalaureate degree at an accredited institution and are not currently enrolled at the university must complete a program application, a university application, and submit official transcripts from all previous colleges directly to the School of Education. Applications will not be processed until all materials are received in the Office of Student Services.

### Advising

Students are responsible for obtaining a student handbook and program checklist in Education 151, available online at [www.colorado.edu/education/students/teachereducation.html](http://www.colorado.edu/education/students/teachereducation.html). These materials include specific information for all teaching fields and information on how to seek advising.

Off-campus students may obtain advising materials online at [www.colorado.edu/education/students/teachereducation.html](http://www.colorado.edu/education/students/teachereducation.html) or by calling 303-492-6555.

At CU-Boulder, degree requirements vary among the schools and colleges. Students seeking a degree at the University of Colorado should consult, as soon as possible, with an advisor in the college or school from which they expect to graduate and with the School of Education advisor.

Students are encouraged to become familiar with the teacher education requirements by comparing their own transcripts to the published advising materials. Students can then talk with an advisor before applying to the program or they may wait until after their applications are processed. Students seeking teacher training in French, German, Japanese, Latin, Russian, Spanish, or music should see the designated advisor for that teaching field in addition to the School of Education advisor.

Advising also may be obtained by e-mail through [EdAdvise@colorado.edu](mailto:EdAdvise@colorado.edu). When requesting e-mail advising, students should make questions as specific as possible.

### Graduate Study

Graduate study in education at the University of Colorado is administered through the Office of Student Services, School of Education, and all inquiries regarding programs should be directed to the following address:

Office of Student Services  
School of Education  
University of Colorado at Boulder  
249 UCB  
Boulder, CO 80309-0249

Detailed program materials and *The School of Education Graduate Student Handbook* are available from the School of Education Student Services office, Education 151 and online at [www.colorado.edu/education/prospective/gradprograms.html](http://www.colorado.edu/education/prospective/gradprograms.html). The degrees available in the various areas of graduate study are listed below:

#### Curriculum and Instruction (K–12 humanities education; K–12 mathematics and science education; K–12 literacy education)

Master of arts  
Doctor of philosophy  
Secondary Master's Plus (MA+) Licensure Programs  
CU-Boulder offers special programs for prospective secondary teachers that combine a master of arts degree in instruction and curriculum in a content area and teacher licensure to qualified students already holding bachelor's degrees. Admission is highly competitive, and program completion requires a two-year commitment of course work and school placements. Students in the MA+ programs become eligible for a Colorado teaching license after three semesters; they complete remaining course work for the master's degree in the

fourth semester. Applicants must meet all graduate requirements listed below and undergo an extensive screening process. This program admits students for fall semester only. Complete program information is available in the Office of Student Services, Education 151 or by calling **303-492-6555**.

#### **Educational-Psychological Studies** (educational psychology)

Master of arts  
Doctor of philosophy

#### **Research and Evaluation Methodology** (methods of educational research and evaluation, including statistics, measurement, and qualitative methods)

Doctor of philosophy

#### **Social and Multicultural Bilingual Foundations** (bilingual and multicultural education; bilingual/special education; education and cultural diversity; English as a second language; cultural, historical, social, and philosophical foundations; educational policy)

Master of arts  
Doctor of philosophy

CU-Boulder does not offer programs in early childhood education, physical education, art education, counseling, school administration, higher education, school psychology, or educational technology.

### Teaching Endorsements at the Graduate Level

Through the School of Education (and in conjunction with other departments), the University of Colorado at Boulder offers advanced course work leading to graduate level teaching and special services training in the following areas:

- Linguistically diverse education (grades K–12)
- Linguistically diverse education specialist: bilingual education (grades K–12)
- Reading teacher (grades K–12)
- Special education generalist (grades K–12)
- Special education specialist (grades K–12)
- Special services (offered through SLHS):
  - Audiologist (ages 0–21)
  - Speech/language pathologist (ages 0–21)

All of the above programs have degree, licensure, or experience requirements that must be fulfilled before admission. Please check with the department before applying.

### Admission

Prospective students seeking admission to a graduate degree program should request application forms from the University of Colorado at Boulder, Office of Student Services, 249 UCB, Boulder, CO, 80309-0249, or visit online at [www.colorado.edu/education/prospective/gradprograms.html](http://www.colorado.edu/education/prospective/gradprograms.html). The completed forms should be returned to that office. Prospective graduate students should also read the Graduate School section for additional admission information. If test scores are required for admission to the desired program, applicants should request that the Educational Testing Service send their scores on the verbal reasoning, quantitative reasoning, and analytical writing sections of the Graduate Record Examination (GRE) to the Office of Student Services. A doctoral applicant who has not taken the GRE should arrange to do so.

Admission to all programs and degrees in the School of Education is selective. Meeting minimal admission requirements does not guarantee admission.

Application papers and all supporting documents, including GRE or Miller's Analogy Test (MAT) scores, if these scores are required for admission to the desired program, must be in the school's Office of Student Services by the admission deadline. Master's deadlines are September 1 for spring semester and February 1 for summer session and fall semester. The PhD deadline is January 1. The PhD program only has one admission cycle each year. The international student deadline for PhD students is December 1. Students should visit the International Student Admission website for additional forms and information, [www.colorado.edu/prospective/international](http://www.colorado.edu/prospective/international). The Secondary Master's Plus (MA+) deadline is January 1. Note that some program areas (MA+ and PhD) admit students for fall semester only.

### Advising

Graduate students are assigned an individual faculty advisor after admission and are required to submit a formal plan of study, approved by their advisor, before the end of the first full year of study. Graduate students may obtain program information from the School of Education, Office of Student Services, Education 151, or from their faculty advisors.

### General Information

#### *Maximum Load and Part-Time Study*

A maximum of 15 semester hours in any one semester may be applied toward degree requirements. During the summer, 9 semester hours is the maximum that will be counted toward education graduate degrees. Within this limit, students may take up to 6 semester hours in a five-week summer term, and/or 3 semester hours in a three-week term. During the academic year for financial aid purposes, students will be regarded as having a full load if they are registered for 5 or more semester hours in courses numbered 5000 or above, or are registered in a minimum of 5 thesis hours. At least four semesters of residence credit, two of which must be consecutive in one academic year, must be earned for work taken at CU-Boulder. See the Graduate School section for clarification.

#### *Quality of Work*

A grade average of *B* (3.00) or better is required for all work taken for any graduate degree. Transferred credits are not included when calculating grade averages.

A mark below *B-* will not be credited toward the PhD program; a mark below *C* is not acceptable for MA students. Any graduate course in which a mark of *D* or *F* is reported as failed and must be repeated and passed if it is required in a student's degree program. Students who do not maintain at least a *B* (3.00) average or better may be suspended by the dean of the Graduate School upon the recommendation of the director of graduate studies in the School of Education. Students may also be suspended from the Graduate School for continued failure to maintain satisfactory progress toward the degree sought.

### Master of Arts in Education

The master of arts degree is available, comprising one academic year or more of graduate work beyond the bachelor's degree.

The master's degree must be completed within four years of initial enrollment. The MA plan II (nonthesis) degree requires a minimum of 30 semester hours. *See the Graduate School section for discussion of plan I and plan II.* Students may transfer no more than 9 semester hours of work taken at another institution or as a nondegree student at CU-Boulder.

All program areas have outlined a recommended or required program of study, and students pursuing a degree are expected to follow that program unless they have appropriate substitutions arranged in advance with their advisors and the director of graduate studies. Pamphlets outlining the programs of study in education are available in the Office of Student Services.

At the beginning of the final term of study, each student must submit a form titled, "An application for admission to candidacy for an advanced degree." These forms are available in the Office of Student Services. If a minor is included, the form must first be signed by a representative of the student's minor department or program area. The form must be signed by the student and the student's advisor, and then submitted to the school's Office of Student Services for School of Education approval and then to the Graduate School for final approval. All students are required to pass a comprehensive-final examination or its equivalent, as determined by the program's faculty committee. (For time limits and other information, see the Graduate School section under Master's Degree.)

### *Education as a Minor Field*

In MA programs for majors outside the School of Education, students may include education as a minor if both their major department and the associate dean for graduate studies in the School of Education approve. For master's degrees, a minor in education consists of at least 9 hours of study in related courses. Not more than 2 semester hours may be transferred from another institution. A minor in education alone will not meet Colorado licensure requirements.

Students who propose to minor in education must have had sufficient undergraduate work in education to prepare them for graduate study in the field. Appraisal of undergraduate preparation will be made by the director of graduate studies.

### **Doctoral Study in Education**

In addition to the information included here, prospective PhD students should see the Graduate School section, and obtain a current copy of the *School of Education Graduate Handbook*.

The School of Education offers the doctor of philosophy (PhD) in education. Most students take four to six years to complete the course work, examinations, and dissertation required for the doctoral degree.

The school requires at least two semesters of full-time study in residence (one semester must be during the first two years of doctoral study). The School of Education expects that students will not hold a full-time job during their two semesters of residence.

In addition to course work requirements, doctoral students should be immersed in ongoing research with the faculty as early in their program as possible. All doctoral students in the school will be required to complete, at a minimum, one scholarly product; other research endeavors prior to the dissertation are desirable. Each of the program committees has established a structure for implementing this requirement. For example, in some programs students work individually with their faculty advisors; in other programs students make the research product an extra course requirement attached to a professional seminar.

### *Admission Requirements*

Applicants for admission to doctoral study are expected to have a strong liberal arts background. A minimum undergraduate grade point average of 2.75 is required, but applicants are judged competitively so that most admitted applicants have GPAs of 3.00 or higher. A GPA of 3.00 or above is expected on

all graduate work completed. PhD applicants are not required in all cases to have a master's degree; the decision rests with the program area faculty. At least two years of professional teaching experience relevant to the applicant's proposed area of study is strongly encouraged and recommended for programs in curriculum and instruction.

The Graduate Record Examination (GRE) (verbal and quantitative reasoning) is required for admission; there is no established minimum score. Faculty consider the GRE score as one factor among many in making admission decisions. An interview with a faculty admissions committee may be required.

### *Degree Requirements*

Incoming doctoral students are required to complete a one-year introductory sequence as a cohort. The sequence is comprised of courses in Perspectives on Classrooms, Learning, and Teaching (EDUC 8210); Introduction to Educational Research and Policy (EDUC 8220); Quantitative Research Methods (EDUC 8230/8240); and Qualitative Research Methods (EDUC 8250/8260). In the second year, students also enroll in the Doctoral Seminar in Multiculturalism and Education (EDUC 8014). All other required course work is determined by the student's program area.

Fifty-six semester hours of course work beyond the master's degree is the normal requirement for the PhD. All program areas committees have outlined a program appropriate for individuals pursuing study in their area, and students are expected to follow that program unless they have arranged appropriate substitutions in advance with their advisor and the director of graduate studies. Pamphlets outlining the recommended programs of study in education are available from faculty or the Office of Student Services.

No continuing education work is accepted for the PhD.

### *Culture/Language Requirement*

The culture/language requirement consists of two components: the Multiculturalism seminar (EDUC 8014) and a language component. The Multiculturalism seminar is scheduled every spring semester, is a doctoral-level course, and should be taken in the third semester of the student's course sequence (first semester of second year). Introductory language courses (see item #1 below) are recorded on the Degree Plan form as having satisfied the language requirement but may not be listed as doctoral course work. To fulfill the language component one of three options are possible:

1. Satisfactory completion of two semesters of college-level conversational language course taken at an accredited institution within the three years preceding admission with a grade of C- or better. The conversational language requirement also can be met by:
  - a. Conversational courses offered through Continuing Education. If the courses are taken for no credit, the instructor must provide written documentation of second-semester oral proficiency. Students should inform instructors before the start of the courses that such certification is sought.
  - b. Introductory Boulder campus courses such as SPAN 1010, ITAL 1010, FREN 1010, GRMN 1010, etc. These traditional courses meet the conversational requirement because instruction is conducted in the language and substantial language labs are part of the course expectations. Courses taken at another institution must be equivalent to the above courses to count toward this requirement.

- c. Satisfactory performance on an oral proficiency examination indicating sufficient mastery to complete a second-semester college course. (Given a specific request, arrangements can be made for such exams to be available through language department faculty or from Continuing Education instructors on a case-by-case basis.)
2. The BUENO Puebla experience or a similar alternative experience to be approved by an EECD faculty member.
3. Course on Language Issues in Educational Research.

### *Comprehensive Examination*

Before taking the comprehensive examination, students must submit the “Application for Admission to Candidacy for an Advanced Degree,” available in the school’s Office of Student Services.

Near the end of the term when students complete their course work and if their advisor approves, they take a comprehensive examination given by program area faculty that covers foundational knowledge in the program area. Students who fail this examination may repeat it once, at a time to be determined by the examining committee.

### *Dissertation*

In addition to course work, a doctoral dissertation for 30 semester hours of credit is required. A student registers for EDUC 8994 Doctoral Dissertation for three or more terms, but not more than 10 semester hours in any term. Not more than 10 dissertation credit hours taken in semesters prior to the semester in which the comprehensive examination is passed may be counted in the required 30 dissertation hours. After satisfactory completion of the comprehensive examination, the student must continuously register for a minimum of 5 dissertation hours during fall and spring semesters until the final defense. Off-campus students may register for 3 dissertation credit hours. On- and off-campus students must be registered for 5 hours during the semester the defense is completed.

When the student and the chair of the dissertation committee agree on a dissertation subject, they work with the director of graduate studies to identify a five-person committee. Then the student prepares a detailed prospectus and arranges for a meeting with the committee. After committee approval, the student may proceed with the research. Research involving human subjects must also have the approval of the university committee on human research. During the research for and the writing of a dissertation, a grade of *IP* (in progress) is reported for the credit hours taken; if the dissertation is completed and accepted as satisfactory, a grade is reported for the student’s record.

### *Time Limits*

Time limits for the PhD in education are the same as time limits for all Boulder PhD programs; see the Graduate School section for PhD time limits.

When students have passed the comprehensive examination, they must register each semester until the degree is attained, and pay the standard fee as announced by the Graduate School.

### *Progress toward a Degree*

Doctoral study entails a long period of scholarly endeavor, which requires a time schedule. Students are responsible for meeting the deadlines involved.

### *Opportunities for Assistantships*

The School of Education has a limited number of assistantships administered by the dean on the recommendations of faculty and the associate dean for teacher education or associate dean for graduate studies. Some assistantships involve the supervision of student teachers; others involve helping professors in their teaching or research. Taxable stipends in amounts set by the university are paid for all assistantships. Appointments are usually made in terms of one-fourth time (10 hours a week) or one-half time (20 hours a week). Inquiries should be directed to the associate dean for graduate studies.

### **Faculty—School of Education**

LORRIE A. SHEPARD, dean; professor. BA, Pomona College; MA, PhD, University of Colorado.

LORENZO ARAGON, assistant research professor. BA, University of Northern Colorado; MA, University of Colorado at Boulder; PhD, University of Colorado Denver.

LEONARD M. BACA, professor. STB, Catholic University of America; MA, University of New Mexico; EdD, University of Northern Colorado.

KANESHA BAYNARD, senior instructor attendant. BA, Cornell College; MA, National Louis University, Governors State University.

DONNA MCCLURE BEGLEY, senior instructor. BS, University of Southern Oregon and University of Alaska; MEd, College of William and Mary; PhD; Southern Illinois University.

DEREK BRIGGS, assistant professor. BA, Carleton College; PhD, University of California, Berkeley.

GREGORY CAMILLI, professor. BA, MA, PhD, University of Colorado.

GINA CERVETTI, assistant professor. BA, Loyola Marymount University; MS, Rensselaer Polytechnic Institute; PhD, Michigan State University.

ANNE DiPARDO, professor. BA, California State University; MA, University of California, Los Angeles; EdD, University of California, Berkeley.

PHILIP DiSTEFANO, chancellor; professor. MA, West Virginia University; BS, PhD, Ohio State University.

RUBEN DONATO, professor. BA, University of California, Santa Cruz; MA, PhD, Stanford University.

ELIZABETH DUTRO, associate professor. BS, La Sierra University; MA, San Francisco State University; PhD, University of Michigan.

MARGARET A. EISENHART, distinguished professor. BA, Emory University; MA, PhD, University of North Carolina.

KATHY C. ESCAMILLA, professor. BA, University of Colorado at Boulder; MS, University of Kansas; PhD, University of California, Los Angeles.

JEFFREY A. FRYKHOLM, associate professor. BA, MS, Whitworth College; PhD, University of Wisconsin—Madison.

ERIN FURTAK, assistant professor. BA, University of Colorado at Boulder; MA, University of Denver; PhD, Stanford University.

KAREN FRANCIS GERMANN, senior instructor. BS, Clarkson University; MEd, University of Nevada—Las Vegas.

KRIS DIANE GUTIERREZ, professor. MA, Arizona State University; PhD, University of Colorado.

VICTORIA HAND, assistant professor. BA, University of California, San Diego; MA, PhD, Stanford University.

KENNETH R. HOWE, professor. BA, MA, PhD, Michigan State University.

COLLINUS NEWSOME HUTT, senior instructor. BA, University of Illinois, Champaign-Urbana; MA, University of Colorado.

A. SUSAN JUROW, assistant professor. BA, New York University; MA, PhD, University of California, Berkeley.

BENJAMIN R. KIRSHNER, assistant professor. BA, Brown University; MA, Harvard University; PhD, Stanford University.

JANETTE KETTMANN KLINGNER, professor. BA, San Jose State University; MS, PhD, University of Miami.

PHILIP LANGER, professor. AB, University of Michigan; MA, New York University; PhD, University of Connecticut.

MARGARET D. LeCOMPTE, professor. BA, Northwestern University; MA, PhD, University of Chicago.

ROBERT L. LINN, distinguished professor emeritus.

DANIEL P. LISTON, associate dean for graduate studies; professor. BA, Earlham College; PhD, University of Wisconsin.

WILLIAM J MATHIS, senior instructor. BA, MA, University of Tennessee; PhD, University of Texas–Austin.

WILLIAM MCGINLEY, associate professor. AB, Western Kentucky University; MEd, Idaho State University; PhD, University of Illinois.

MONETTE McIVER, assistant professor. BA, Spellman College; MA, PhD, University of Colorado at Boulder.

LINDA MIZELL, assistant professor. BA, MA, Mount Holyoke College; EdD, Harvard Graduate School of Education.

LAURA MOIN, assistant professor. MA, Universidad de Buenos Aires; PhD, University of Pittsburgh.

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MICHELE MOSES, associate professor. BA, University of Virginia; MEd, University of Vermont; MA, PhD, University of Colorado at Boulder.

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EDWARD WILEY, assistant professor. BA, MA, University of Nebraska; MS, PhD, Stanford University.

SHELBY ANNE WOLF, professor. BA, University of Richmond; BA, MS, University of Utah; PhD, Stanford University.

# School of Engineering and Applied Science

*Robert H. Davis, dean*

422 UCB • phone: 303-492-5071 • fax: 303-492-2199  
school website: [engineering.colorado.edu](http://engineering.colorado.edu)

**T**HE COLLEGE OF ENGINEERING AND APPLIED SCIENCE offers 12 undergraduate degrees: aerospace engineering sciences, chemical engineering, civil engineering, electrical and computer engineering, environmental engineering, mechanical engineering, chemical and biological engineering, computer science, applied mathematics, and engineering physics. The first eight of the degree programs are accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 210202-4012, telephone 410-347-7700. The chemical and biological engineering program is a new degree program for which accreditation is currently being sought from the Engineering Accreditation Commission of ABET. The computer science program is currently seeking accreditation from the Computing Accreditation Commission of ABET. The two remaining degree programs are applied sciences; accreditation from ABET is not being sought for these programs. Degrees in applied mathematics and engineering physics are offered in cooperation with the Departments of Applied Mathematics and Physics in the College of Arts and Sciences. The CU-Boulder campus is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools.

## Mission

The mission of the College of Engineering and Applied Science is to generate new knowledge in engineering and related fields to equip students from diverse background as future leaders and responsible citizens in these fields for the betterment of individuals and society. Its vision is to be a world leader in engineering research and education, with an emphasis on *integrated and discovery learning* and on *engineering for global society*.

The college embraces the following core values:

- Innovative research, creating knowledge to improve the global society
- Integrated learning, where students learn through team-based projects and other hands-on experiences integrated with traditional theory-based curricula
- Discovery, professional, and service learning, where students learn by undertaking research, internships, international experiences, and campus or community projects
- Inclusive excellence of diverse faculty, staff, and students, with high ethical standards of integrity, responsibility, honesty, and respect for others from differing backgrounds

The college seeks the following outcomes in their graduates:

- Technical experience and knowledge in modern engineering, mathematics, and science



- Ability to communicate effectively with diverse peoples of other cultures
- Ability to think critically, analyze data, and formulate and solve complex problems
- Ability to contribute effectively as individuals in multidisciplinary teams
- Knowledge of contemporary issues and preparation for social leadership and work citizenship
- Desire and skills for lifelong learning and personal and professional development
- Passion for serving others and commitment to sustainability

Additional information about the academic programs, services, and faculty of the College of Engineering and Applied Science is found at [engineering.colorado.edu](http://engineering.colorado.edu).

## Facilities

Students have an opportunity to study engineering with about 200 faculty members of national and international reputation. They have access to the superb facilities of the College of Engineering and Applied Science, including the ITL Laboratory, a unique, award-winning facility that provides hands-on design experience to undergraduate students, and the Discovery Learning Center, which promotes undergraduate involvement in research with faculty, graduate students, and sponsoring organizations. Each engineering department has laboratories suitable for undergraduate and graduate instruction and experimental research through the doctoral or postdoctoral level. Specific information on these facilities may be obtained from the departments concerned.

## Computing

Many courses offered by the college place strong emphasis on the use of computers. Entering freshmen receive instruction and undertake academic projects involving computers. While most students choose to obtain personal computers, several hundred computers are available in open laboratories in the college, and over one thousand are located throughout the campus for student use. Several computer laboratories are located in the Engineering Center.

More computing information may be found under Campus Facilities in the General Information section, in engineering department summaries, and under Laboratories and Special Equipment in the Graduate School. Information Technology Services provides its computer recommendations at [www.colorado.edu/its/recommendations](http://www.colorado.edu/its/recommendations).

## Degree Programs

In most departments of this college, several academic options are offered within each degree program. Some programs of study are oriented toward graduate work, and others toward engineering practice.

Engineers work in a wide variety of disciplines, with the college's 12 undergraduate and eight graduate degree programs reflecting this diversity. The following descriptions summarize these areas.

**Aerospace engineering sciences** prepare students for successful and rewarding careers in aerospace and other high-tech industries, national research laboratories, government services, and academia. Their program provides students unique opportunities to develop in-depth technical knowledge, effective communication skills, and a systems engineering perspective that enables them to develop creative solutions to complex problems. The curriculum encompasses core aerospace subjects including fluids, thermodynamics, dynamics, orbital mechanics, structures, and systems; design of air and space vehicles; and exciting multidisciplinary applications including bioastronautics, unmanned systems, remote sensing, and GPS.

**Applied mathematicians** have the expertise and mathematical sophistication necessary to make contributions in a wide variety of fields, including scientific computation, actuarial science, financial modeling, and most areas of science and engineering that have a mathematical basis.

A professional applied mathematician may work with engineers, scientists, programmers, and other specialists. The curriculum at CU-Boulder is designed to have the breadth for such an interdisciplinary career.

Course offerings at the undergraduate level focus on providing students with mathematical tools, problem-solving strategies, and expertise useful in science and engineering. To fulfill requirements, a concentrated area of engineering courses (or approved natural science courses) must be completed. The college has formulated several recommended options within the discipline.

**Architectural engineering** prepares students for leadership careers in the building design, management, and construction industry and for research at the graduate level on building-related topics. This course of study fulfills the academic requirements for registration as a professional engineer.

The architectural engineering curriculum is recommended for those wishing to specialize within the building industry in engineering design (heating, cooling, illumination, electrical, solar, and structures) or construction and contracting (facilities management). The architectural engineering student may select any one of several areas of specialization offered: HVAC (heating, ventilating, and air conditioning), illumination, electrical, building energy, structures, or construction.

**Chemical engineering** prepares students for careers in a range of industries including energy, consumer products, petrochemicals, semiconductors, medicine, environment, and materials. Modern industry depends on chemical engineers to tailor manufacturing technology to the requirements of its products, and chemical engineers play a central role in development of new polymeric materials, alternative energy sources, and safe, efficient processes for chemical synthesis.

The undergraduate program in chemical engineering includes curricular options in environmental, materials, microelectronics, computing, bioengineering, and a premedicine curriculum track. There are active and exciting research and educational programs in biotechnology, pollution control, novel membrane separations, and advanced polymeric and ceramic materials.

**Chemical and biological engineering** prepares students for careers in biotechnology, pharmaceuticals, medicine, and materials. This degree program adapts a core chemical engineering curriculum to allow for greater depth in biological aspects of chemical engineering. Exploring the structure of protein molecules, the functioning of cells, and the growth and regeneration of tissues are among the new frontiers that chemical and biological engineering students will address.

In addition to the standard curriculum, a premedicine curriculum is also offered. The chemical and biological engineering department has active research and educational programs in the exciting field of biotechnology, which involves the use of individual cells and their components for producing pharmaceuticals and other important products. The department is also active in biomedical engineering, which involves medical devices, tissues, and biomaterials. A formal cooperative education (co-op) program is offered by the department and its industry partners.

**Civil engineering** offers a wide range of challenging careers for students interested in the planning, design, and supervision of the construction of facilities essential to modern life in both the public and private sectors. Varying widely in nature, size, and scope, such facilities include buildings, bridges, tunnels, highways, transit systems, dams, airports, irrigation projects, water treatment and distribution facilities, collection and treatment of water waste, structures for space exploration, and offshore engineering designs.

In the coming decades, almost two billion more people will populate Earth in both developed and developing countries. This growth will create unprecedented demands and opportunities for new methods and innovations in energy production, food supply, land development, water treatment, transportation systems, materials processing, waste disposal, healthcare delivery, environmental preservation, and structural designs. Civil engineers play both direct and indirect roles in meeting many of these needs, with the goal of providing and improving the quality and infrastructure of life in general.

**Computer science** offers study in the fields of computer architecture, operating systems, networking, mobile computing, computer security, computational biology, robotics, algorithm design, artificial intelligence, software and web engineering, programming languages, database design and data mining, human-computer interaction, computer-supported cooperative work, machine learning, lifelong learning and design, numerical and parallel computation, speech and language processing, scientific computing, and theoretical computer science.

Graduates typically take positions as software engineers for computer manufacturers or software firms, advanced applications programmers in scientific research firms, or technically oriented usability experts or systems designers in commercial or government settings.

**Electrical engineering** offers study of the basic science and technology of information and energy. Its areas of knowledge include information theory and communications systems, computers and digital systems, signal processing and instrumentation, feedback systems and automatic control, electrical and electronic devices and systems, energy conversion and power systems, renewable energy, and electromagnetics and microwave devices. Students learn how this basic knowledge is applied to such modern technologies as computers, telecommunications, biomedical systems, and remote sensing. The curriculum accommodates a variety of student interests including design, production, testing, consulting services, research, teaching, and management. Graduates pursue careers in a large variety

of fields in the computer industry, telecommunications, instruments, the biomedical industry, aerospace, and academia. Some go on to careers in other professions such as law or medicine.

**Electrical and computer engineering** offers the same curriculum as electrical engineering except that required courses in computer hardware and software replace some upper-division electives. Like electrical engineering, it accommodates broad student interests from design to service and from research to management. Its graduates take positions in fields as diverse as those listed above for electrical engineering.

**Engineering management** equips individuals with technical management expertise, preparing them to be leaders in high technology organizations. The program provides a comprehensive graduate master's degree program and numerous professional graduate certificates for working engineers and technical professionals that can be taken on campus or through distance education. Areas of technical management concentration are in managing innovation, project management, performance excellence, engineering entrepreneurship, quality systems and Six Sigma certifications.

**Engineering physics** provides students with a broad exposure to the basic physical theories and mathematical techniques underlying engineering. The program may be specialized to meet the student's interests through engineering electives. Most students become involved in laboratory research, and graduates find opportunities in optics, electronics, magnetics, and other hardware-based job markets. The program also provides excellent preparation for graduate study in physics, applied physics, and other areas of the natural sciences and engineering.

**Environmental engineering** plays a vital role in maintaining the quality of both human environmental systems and the natural environment. Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems impacting the biosphere and land, water, and air quality. Environmental issues affect almost all commercial and industrial sectors, and are a central concern for the public, for all levels of government, and in international relations.

The degree in environmental engineering includes course work in advanced mathematics, biology, chemistry, and physics. In common with other engineering fields, courses in solid mechanics, fluid dynamics, and thermal sciences are central to the environmental engineering degree. Course work specific to environmental engineering includes water and wastewater treatment, hazardous waste storage and treatment, and air pollution control.

**Mechanical engineering** prepares students for careers in a variety of industrial sectors including transportation, energy, electronics manufacturing, medical, and environmental. Based on their education in the fundamentals of mathematics, physics, and chemistry, mechanical engineers deal with diverse components and systems such as internal combustion engines, automobiles, computers, power plants, aircraft, medical instruments, space platforms, and pollution control devices. Career opportunities include work in basic and applied research and development, design, manufacturing, project management, consulting, and teaching. They are employed by a wide variety of industrial, governmental, and educational organizations. A mechanical engineering background also provides a firm foundation for other professional careers such as engineering management, law, and medicine.

**Open Option Program.** The College of Engineering and Applied Science provides the opportunity for new first-year undergraduate students to delay their selection of an engineering major by enrolling in the open option program. This program is available only to new first-year students; students in the program are

required to select a specific engineering degree program no later than the end of the spring semester, regardless of when they entered the open option program. This provides students with one or two semesters to explore the variety of engineering degree programs before selecting a major.

A first-year experience coordinator in the college provides advising for all engineering open option students. This advising is supplemented with advisors in each engineering degree program. Students selecting the open option program are subject to all College of Engineering and Applied Science academic rules and policies. They are also required to satisfy any remaining minimum academic preparation standards (MAPS) required for graduation. For more information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (open option).

## Programs of Special Interest

### Professional Registration

The need for professional registration depends on the field of engineering and the nature of practice in that field. Engineers in private professional practice generally need to be registered. Currently, registration is required in all states for the legal right to practice professional engineering. Although there are variations in state laws, graduation from an accredited curriculum in engineering, subscription to a code of ethics, and four years of qualifying experience are minimum requirements for registration. Two days of examinations covering the engineering sciences and the applicant's practical experience are also required in most states and territories. A student begins this professional registration process by taking the Fundamentals of Engineering (FE) eight-hour examination during senior year in this college.

### Active Learning

The College of Engineering and Applied Science defines active learning as "enhancing knowledge, skills, and understanding through practical experience." The college's goal is to provide all students with the opportunity to participate in enrichment experiences and partnerships with individual faculty and professionals in discovery, service, and professional learning. Several programs are in place to financially support students engaged in undergraduate research or "discovery learning" with faculty, graduate students, and research sponsors. Students seeking professional learning experiences such as internships and co-op assignments with a participating employer also typically earn hourly wages, while those pursuing service learning opportunities in the college, community, or beyond could earn wages or course credit.

International active learning opportunities include assisting developing communities through Engineers Without Borders, a national nonprofit organization started at CU-Boulder; and arranging an international internship through the International Engineering Certificate Program. For more information about active learning programs and opportunities, visit [engineering.colorado.edu/activelearning](http://engineering.colorado.edu/activelearning).

In addition, the college offers a First Year Engineering Projects course as a general engineering elective, which provides students with collaborative, hands-on experience in designing and building engineering devices early in the engineering curriculum, and most undergraduate majors in the college require completion of a senior capstone design course.



## Integrated Teaching and Learning Program

The Integrated Teaching and Learning (ITL) Program emphasizes hands-on, inquiry-based learning experiences throughout the K–16 engineering curriculum. The ITL Program encompasses college-wide curricular initiatives and has created a unique learning environment to enable and support them—the Integrated Teaching and Learning Laboratory (ITLL).

The interdisciplinary ITL Laboratory is a 34,000 sq. ft. hands-on learning environment that features interactive laboratory plazas and supports hands-on experimentation, pervasive data acquisition and analysis capability, design studies, team work areas, active learning spaces, and state-of-the-art manufacturing and electronics fabrication capability. It is heavily used by engineering students of all disciplines and is supported by a dedicated team with an unwavering focus on outstanding service.

The ITL Program features an innovative interdisciplinary undergraduate curriculum that includes a First-Year Engineering Projects course that engages student teams to experience the design process in a hands-on way, culminating in a public design expo each semester. The nationally recognized K–12 ITL engineering program focuses on attracting and preparing more diverse and well-prepared youth to careers in engineering and technology. Visit [itll.colorado.edu](http://itll.colorado.edu).

## Study Abroad

In today's international environment, engineers frequently work and travel in foreign nations or with foreign engineers. Therefore, it is desirable that engineering students familiarize themselves with foreign cultures by selecting appropriate courses or by studying abroad. The University of Colorado has over 50 programs that enable students to undertake course work in engineering. These include programs at the Universities of New South Wales, Wollongong, and Murdoch in Australia; the Universidad de Costa Rica in the Americas; the Universities of East Anglia, Lancaster, and Sussex in England; Uppsala University in Sweden; the American University of Cairo in Egypt; the University of Ghana; the Universidad Politecnica de Madrid; the Instituto Tecnológico y de Estudios Superiores de Monterrey in Mexico, and others. All participants in the university study abroad programs remain enrolled at the university; the pass/fail grade option is used by this college for course work taken during study abroad (but is exempt from college and major department pass/fail limitations). Financial aid from the university can be applied to the program costs in some cases, and special study abroad scholarships may be available for program participants. More information about studying abroad is available at the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123, **303-492-7741**, or [studyabroad.colorado.edu](http://studyabroad.colorado.edu).

Engineering departments may also assist students wishing to study engineering at the Ecole National des Ponts et Chaussées in Paris, the Ecole Polytechnique Feminine in Paris, the University of Oviedo in Spain, and the University of Regensburg. As of fall 2009, the college participates in the Global Engineering Exchange Program (Global E<sup>3</sup>). Please contact the engineering dean's office for more information.

With the proper preparation, students may complete one or two semesters of engineering education during study abroad. All students preparing for study abroad must petition their major department about specific courses planned away from CU and ensure that the college residency requirement is satisfied.

## Certificates

### *Engineering Entrepreneurship Certificate*

This certificate is offered in partnership with the nationally renowned Deming Center for Entrepreneurship in Colorado. It provides the student with the essential knowledge, understanding, and skills to successfully practice entrepreneurship in a start-up venture or within a larger corporation (entrepreneurship). The focus is on how to launch, lead, and manage a viable business starting with concept validation to commercialization and business formation. The program culminates with the development of a business plan for a project that the student chooses and then pitches to business community leaders and venture capitalists.

EMEN 5051 Technology Ventures and Leadership  
EMEN 5710 Business Simulation  
EMEN 5090 High-Technology Marketing  
EMEN 5825 Business Plan Development

More information is available at [emp.colorado.edu/certificates/index.htm](http://emp.colorado.edu/certificates/index.htm).

### *Engineering for Developing Communities Certificate*

This certificate prepares engineering students who have basic competencies in issues that are critical to the understanding of developing communities, whether they are industrialized or less-industrialized (“developing world”) countries. Some relevant topics include sustainability, renewable energy, international education and development, stakeholder empowerment, business, and public health. Obtaining the certificate in EDC indicates to employers that an individual is both technically competent (as evidenced by the student's earned degree in engineering) and has experience evaluating the wide range of social impacts caused by engineering solutions.

For more information, see [engineering.colorado.edu/academics](http://engineering.colorado.edu/academics).

### *Engineering, Science, and Society Certificate*

The certificate in engineering, science, and society leads students into courses that will help them to become engaged with contemporary issues regarding the promotion, use, and possible risks of engineering and applied science. For more information, see [engineering.colorado.edu/academics/ess.htm](http://engineering.colorado.edu/academics/ess.htm).

### *International Engineering Certificate*

The purpose of the certificate is to provide engineering students training in language and culture to help them succeed in today's global marketplace. The college offers certificates in Chinese, French, German, Italian, Japanese, and Spanish. After successful completion of courses, students may complete an internship at a European company or university lab. For more information, see [engineering.colorado.edu/academics/international.htm](http://engineering.colorado.edu/academics/international.htm).

### *Technology Ventures and Product Management Certificate*

Technology venture management and product development is key to the sustained success of any high-technology business in today's intensely competitive and global marketplace. This certificate is designed for the engineer in any size company (Fortune 500 to start-up) who wants to embrace the challenge of managing the strategy and implementation of a new technology product development. Using case studies and realistic business simulation exercises, the student will gain an understanding and practice the skills required to evaluate a technology, consider its viability as a product, and manage the development effort required to deliver a product that provides an exceptional customer experience.

EMEN 5051 Technology Ventures and Leadership  
 EMEN 5090 High-Technology Marketing  
 EMEN 5710 Business Simulation  
 EMEN 5400 Principles of Product Management

More information is available at [emp.colorado.edu/certificates/index.htm](http://emp.colorado.edu/certificates/index.htm).

## Student Organizations

The following honorary engineering societies have active student chapters in the College of Engineering and Applied Science:

Chi Epsilon, civil and architectural engineering society  
 Eta Kappa Nu, electrical engineering society  
 Omega Chi Epsilon, chemical engineering society  
 Pi Tau Sigma, mechanical engineering society  
 Sigma Gamma Tau, aerospace engineering society  
 Tau Beta Pi, engineering society

Student chapters of the following professional or social societies meet frequently to present papers, speakers, films, and other programs of technical interest:

American Indian Science and Engineering Society  
 American Institute of Aeronautics and Astronautics  
 American Institute of Chemical Engineers  
 American Society of Civil Engineers  
 American Society of Heating, Refrigerating, and Air Conditioning Engineers  
 American Society of Mechanical Engineers  
 American Solar Energy Society  
 Architectural Engineering Institute  
 Asian Engineering Society  
 Associated Energy Engineers  
 Associated General Contractors  
 Association for Computing Machinery  
 Association for Women in Mathematics  
 Biomedical Engineering Society  
 Engineering Ambassadors  
 Illuminating Engineering Society of North America  
 Institute of Electrical and Electronics Engineers  
 National Society of Architectural Engineers  
 National Society for Black Engineers  
 Sigma Tau, engineering social fraternity  
 Sigma Xi, scientific research society  
 Society of Automotive Engineers  
 Society of Environmental Engineers  
 Society of Hispanic Professional Engineers and Scientists  
 Society for Industrial and Applied Mathematics  
 Society of Manufacturing Engineers  
 Society of Mexican-American Engineers and Scientists  
 Society of Physics Students  
 Society of Women Engineers  
 Structural Engineers Council

A student organization, the University of Colorado Engineering Council (UCEC), represents students in the College of Engineering and Applied Science. UCEC supervises matters of interest to all undergraduate students through the control board, its legislative body. Students in this college also publish the *Colorado Engineer Magazine*, first published in 1904.

## The BOLD Center

The recently formed BOLD (Broadening Opportunity through Leadership and Diversity) Center melded the college's diversity-focused integrated access, retention, and performance initiatives. Through BOLD-inspired and -led initiatives, the college intends to become a leader in attracting, preparing, and expanding opportunities for students historically underrepresented in

engineering, including students from low-income families and those who are the first in their family to attend college.

The BOLD Center creates a vibrant and inclusive community of students from a wide range of backgrounds and prepares engineers with diverse perspectives to be innovative leaders in a global society. The BOLD Center team thinks broadly and focuses deeply on measurable outcomes to significantly improve upon historical student access, retention, and performance results.

**BOLDly Moving Forward**—The BOLD Center intends to achieve breakthroughs in attracting, preparing, and expanding opportunities for historically underrepresented students in engineering through the development and provision of effective curriculum and support to ensure academic successes. The BOLD team believes that building strong community among students who might otherwise feel isolated in a majority population-dominated environment is key to student success. Thus BOLD nurtures student engagement, academic achievement, and retention through a focus on community building, leadership, and professional development activities, coupled with strong academics and support.

**Why be BOLD?**—Students succeed by becoming part of the inclusive BOLD community and finding out about engineering student societies, mentoring, effective study habits, career services, internships, volunteer opportunities, and participation scholarships. Also, the BOLD Center offers free tutoring of all engineering students in the Student Success Center. Visit [engineering.colorado.edu/bold](http://engineering.colorado.edu/bold).

## Engineering Honors Program

The Engineering Honors Program provides an educational experience that transcends the classroom and is designed to match the unique abilities, needs, and ambitions of the college's best students. The program is for students who want to belong to and contribute to an honors culture that cares more about learning than grades; more about maximizing their opportunities than meeting minimum requirements; more about being thoughtful, critical, engaged, and intentional than passively defined by the vague expectations of others. Central to fulfilling this mission is the new Engineering Honors Program Residential College in Andrews Hall, which includes a residential faculty member, classrooms, special study spaces, and the highest percentage of upper-division students living on campus.

Being part of the Engineering Honors Program will mean all of the following:

- being part of a community of talented and dedicated students
- participating in special honors courses
- having the opportunity to do advanced research
- having a faculty mentor
- having exposure to industry leaders
- having greater access to internships
- completing a senior honors thesis

There will be a combination of college-wide and department-specific honors experiences beginning in the student's very first semester. Incoming first-year students are selected to participate in the Engineering Honors Program via an online application process ([www.cuhonorsengineering.com](http://www.cuhonorsengineering.com)). For those who want to join the program after their first year, each department will have its own application process either at the end of the second or beginning of the third year.

## Herbst Program of Humanities

The Herbst Program of Humanities enriches and broadens the technical education offered in the College of Engineering and Applied Science through discussion-based classes and seminars on the great works in literature, art, history, and political and social thought. As a program of applied humanities, Herbst encourages students to engage in immediately relevant and significant conversations about our world.

The Herbst Program offers courses at all undergraduate levels, but its centerpiece is a two-semester, 6 credit-hour sequence open to juniors and seniors. These seminars, HUEN 3100 and 3200, are limited to 12 students and are devoted almost entirely to roundtable discussions of original texts, primarily in literature and philosophy, but with secondary attention given to art, music, and architecture. These seminars endeavor to help students improve their writing skills, gain confidence and skill in civil discourse on controversial issues, see more clearly the inadequacy of dogmatic responses to complex questions, and develop intellectual rigor on non-technical issues. Students must apply to participate in the Junior Seminars, one or both of which may also satisfy the university's writing requirement.

The Herbst Program offers several different courses for students in their first or second year. HUEN 1010, Introduction to the Humanities, explores such diverse forms of humanistic expression as short novels, poems, visual art, music, drama, and philosophy. HUEN 2010, Tradition and Identity, examines—through ancient epics, modern novels, children's literature, poetry, short stories, drama, film, and philosophy—what it means for you to be you while belonging to a world of others. HUEN 2100, 2120, and 2130 span invention and discovery from the Stone Age through the 20th century. HUEN 2210 Engineering Science and Society explores the ethics and social implications of engineering work. A variety of HUEN 2843 and 3843 Special Topics classes are offered each semester, on such issues as The Meaning of Information Technology, Leonardo da Vinci, The Journey in Literature and Film, and Leadership in Literature. The Herbst Program also offers summer term, study abroad, and Maymester courses.

The Herbst Program was initially funded by an endowment established by Clarence Herbst in 1989, and is sustained by the generous support of a variety of donors, including Linda Vitti Herbst, and by the College of Engineering and Applied Science. See [engineering.colorado.edu/herbst](http://engineering.colorado.edu/herbst).

## Quadrangle Engineering and Sciences Living & Learning Community

Offered in cooperation with the College of Engineering and Applied Science and Housing & Dining Services, the Quadrangle Community is comprised of four small residence halls: Aden, Brackett, Cockerell, and Crosman. This community offers on-site tutoring, access to a computer network configured to match that in engineering computer labs, enhanced academic support services, wireless computer access, and calculus work groups in residence. There is a minimal fee for this Living & Learning Community. Interested students should contact Housing & Dining Services for application information.

## Academic Excellence

### Dean's List

A student in the College of Engineering and Applied Science who completes at least 12 credit hours of course work for a letter grade during the fall or spring semester on the Boulder campus, and who earns a semester grade point average (GPA) of at least 3.600, will be included on the college dean's list for that semester. Notation of "Dean's List" is also placed on the student's internal transcript by the Office of the Registrar.

### Honors at Graduation

In recognition of high scholastic achievement by a student, the designations "Summa Cum Laude," "Magna Cum Laude," and "Cum Laude" will be awarded at graduation, and will be recorded on the diploma and in the commencement program. The specific qualifications to achieve these designations are reviewed and set by the Undergraduate Education Council, with any changes requiring approval by a majority vote of the faculty representatives on this council. At least 50 semester hours must have been earned on the Boulder campus for the student to secure these designations. Beginning with August 2008 graduates, grades from all CU course work are taken into consideration. Grades earned during the semester immediately prior to graduation are not considered for graduates prior to August 2008.

### Scholarships

Undergraduate scholarships are provided by public funds and private donations by alumni, corporations, and friends of the college through gifts to the University of Colorado Foundation, Inc. In some cases, endowments have been established; other scholarships are based on annual gifts. Some companies provide matching funds for gifts from their employees who are alumni. More than 800 scholarships have been made available to qualified students.

Awards are based on demonstrated academic ability and performance. Financial need is considered if designated by the donor (see the Financial Aid section).

For additional information about college-based scholarships, contact the dean's office at **303-735-2440** or see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Undergraduate Scholarships). Students may also contact the Office of Financial Aid at **303-492-5091**.

Anyone interested in providing an undergraduate scholarship or contributing to the scholarship fund may contact the Engineering Development Office, University of Colorado at Boulder, 422 UCB, Boulder, CO 80309-0422, **303-492-7899**.

## Academic Standards

### Academic Policies

Students in the College of Engineering and Applied Science must abide by all college policies and procedures as outlined at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm). Students should refer to this website often since policies, advising guides, and forms may be updated throughout the academic year.

### Ethics

As members of the academic community, students have a responsibility to conduct themselves with the highest standards of honesty and integrity. These qualities are also vital to the profession of engineering.

Academic and non-academic sanctions, which may include suspension or expulsion, are imposed for the following acts, or intent to engage in such acts: plagiarism; illegal possession and distribution of examinations or answers to specific questions; the presentation of another student's work as one's own; performing work or taking an examination for another student; or the alteration, forging, or falsification of official records. This listing is not complete and includes only some types of academic dishonesty. Any student accused by a course instructor of academic dishonesty will be allowed to remain in the course until such time the student acknowledges an act of academic dishonesty or until a hearing has determined that an act of academic dishonesty has been committed. For additional information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Academic Honesty) and the Student Honor Code Policy at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode). See also Academic Integrity and Student Conduct under Campus Policies in the General Information section.

### Academic Standing

To remain in good standing in the College of Engineering and Applied Science, a student must maintain satisfactory academic performance, as measured by grades reported to and calculated by the Office of the Registrar, and satisfactory academic progress toward completion of a bachelor of science degree in the college. CU cumulative, semester, and major GPAs should all be at or greater than 2.000. Failure to meet these requirements results in the student being placed on academic probation and, if not corrected, on academic suspension. A student may be directly placed on academic suspension if retroactive grade changes lower their cumulative or prior semester GPA, or if their cumulative CU GPA falls below 1.000. For additional information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Academic Probation and Suspension).

### Academic Probation

Academic probation is normally the first step taken by the college to express concern that a student is not maintaining satisfactory academic performance. It represents an official warning that the student's academic performance must improve or the student will be subject to suspension from the college. Once placed on academic probation, a student remains in that status the following two semesters (summer term not included) of enrollment as an undergraduate student in the College of Engineering and Applied Science.

If a student's cumulative University of Colorado at Boulder GPA drops below 2.000, or the student's semester GPA is less than 2.000 for two consecutive semesters (summer term not included), the student is placed on academic probation. Once placed on academic probation, the student must meet the academic requirements imposed by the probation sanction or will be academically suspended from the College of Engineering and Applied Science.

Students placed on academic probation by cumulative grade point average must raise their cumulative University of Colorado GPA to at least 2.000 for the two following semesters (summer term not included). Students are also subject to probation by the consecutive semester GPA rule; this rule prescribes that a student placed on academic probation by the consecutive University of Colorado semester grade point average rule must maintain a semester GPA of at least 2.000 the two following semesters (summer term not included).

If probation is due to both cumulative and semester GPAs, students are required to maintain both cumulative and semester

GPAs of at least 2.000 for the two following semesters (summer term not included).

While on academic probation, a student must enroll for and complete at least 12 credit hours per semester (summer term not included) of courses that meet engineering degree requirements. Course work taken above minimum degree requirements in humanities, social science, and ROTC subjects does not count toward this minimum course load requirement, and students may not elect to take any courses with the *pass/fail* grade option.

### Academic Suspension

Academic suspension is the involuntary withdrawal of a student from the college. It reflects the college's position that the student is unable to meet minimum academic requirements for a bachelor of science degree.

If a student does not maintain satisfactory academic performance, that student is placed on academic suspension from the College of Engineering and Applied Science. A student may be placed directly on academic suspension if retroactive grade changes lower the cumulative or prior semester GPAs, or if the cumulative CU GPA falls below 1.000.

The conditions of academic suspension are as follows:

1. The period of the suspension is indefinite, but must be for at least one academic semester (summer term not included) for the first academic suspension and two semesters (summer term not included) for the second academic suspension. A third academic suspension is permanent and the student no longer has the option of returning to this college.
2. This academic suspension applies to the College of Engineering and Applied Science on all campuses of the University of Colorado.
3. Suspended students may not enroll in courses, except those offered during summer session and those offered by Independent Learning through the Division of Continuing Education, University of Colorado at Boulder. Approval of these Independent Learning courses is required and no more than two courses may be taken at the same time.
 

Under no circumstances are suspended students to enroll for courses through the Division of Extended Studies, University of Colorado Denver, or Maymester courses offered during the summer term at the University of Colorado at Boulder.
4. If a student, while on academic probation or suspension, transfers to another college or school of the University of Colorado, the College of Engineering and Applied Science considers that student to have permanently changed their choice of academic major to one offered by that college or school. Therefore, the suspended student is not permitted to enroll in any courses taught by the College of Engineering and Applied Science that may apply toward engineering degree requirements. If the suspended student attempts to transfer back into the college through intrauniversity transfer (IUT), the college policy governing IUT admissions applies, and the student must petition the Undergraduate Education Council for removal of the dean's scholastic stop.
5. If an academically suspended engineering student is also a double-degree student with another school or college at CU-Boulder and desires to work on the second degree program while on academic suspension from engineering, this student must drop engineering as a degree program. The student may attempt to return to engineering in the future through the intrauniversity transfer process.

6. The suspended student may elect to attend another accredited institution. However, a student seeking readmission to the college must have raised his or her cumulative CU GPA to at least 2.000; grades earned at other institutions do not transfer to the University of Colorado.

Under special circumstances, the dean reserves the option of extending the period of academic probation for one semester, rather than placing the student directly on academic suspension. This option is exercised only in cases involving ALL of the following conditions:

- The student must have a CU cumulative GPA of at least 1.950.
- The most recent semester of academic performance must demonstrate a highly significant improvement over prior semester(s).
- The student must have been enrolled in a curriculum of study related to one of the degree programs offered by this college and demonstrate an intent to complete that degree program.
- The student cannot have elected the option of enrolling in any course during the past two semesters with the *pass/fail* or no-credit options, or have taken any Incomplete grades.
- The student must have successfully completed at least 15 semester credit hours each of the last two semesters, or a total of 30 hours during the past two semesters on the Boulder campus.
- The student must have abided by all conditions imposed by any prior placement on academic probation.

This special review is exercised at the option of the dean of the College of Engineering and Applied Science. A student can receive this special review only once during his or her period of undergraduate enrollment.

Readmission of a suspended student must be approved by the college and the Boulder campus Office of Admissions. Readmission is not assured; the student must present convincing evidence of his or her ability to continue successfully and complete an engineering undergraduate degree program.

A student returning to the college from academic suspensions returns on academic probation for two semesters (summer term not included).

## Admission and Enrollment Policies

### Freshman Applicants

Prospective engineering students must have a mathematical aptitude and keen interest in science and its methods. Curiosity about the natural principles governing the behavior of forces and materials and the ability to visualize structures and concepts are prerequisites. Strong skills are also essential in written and oral communications.

The college seeks applicants who demonstrate a high probability of completing their designated engineering degree program. Admission is based on the evaluation of many criteria; among the most important are the general level of academic performance prior to admission, performance on standardized tests, and other evidence of motivation, potential, academic ability, and accomplishment. These factors are indicated by academic records, test scores, letters of recommendation, and personal accomplishments.

Specific admission requirements are detailed in Undergraduate Admission in the General Information section of this catalog. All new freshmen are expected to be enrolled as full-time students and must petition to be enrolled part time.

For more information, see [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

### Transfer Students

Students desiring to transfer from other accredited collegiate institutions are considered for admission on an individual basis if they meet the transfer student admissions requirements outlined in Undergraduate Admission in the General Information section. All transfer students are expected to be enrolled as full-time students and must be admitted to the college prior to the last 45 semester credit hours of their degree program.

For more information, see [www.colorado.edu/prospective](http://www.colorado.edu/prospective).

### Intercampus Transfer Students

Admission criteria for students at other CU campuses are the same as for other transfer students.

The student is advised that the engineering degree requirements differ from one campus to another in the number of credit hours required for the degree, specific course content and titles, and residency required in the college. Where there is a difference in credit hours between courses listed as equivalent, the College of Engineering and Applied Science at CU-Boulder applies the smaller number of credit hours. To ensure the maximum acceptance of credit toward degree requirements and minimize the length of time required to complete the degree, the student planning an intercampus transfer must contact the gaining major department as soon as possible once deciding to complete an engineering degree at another University of Colorado campus.

Generally, an intercampus transfer should be accomplished at the end of the first year, with some course selection coordination required between the student and the degree-granting major department during that year. With increased course selection coordination, some students may be able to delay their transfer until the middle or end of the sophomore year. Beyond that point, the student is most likely to lose substantial course credit and time in completing degree requirements.

For additional information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Intercampus Transfer).

### Intrauniversity Transfer Students

Undergraduate intrauniversity transfers (IUTs) on the Boulder campus of the University of Colorado to the College of Engineering and Applied Science are considered on designated criteria. The applicant's academic record must fulfill the IUT admissions requirements of the College of Engineering and Applied Science. Specific admission criteria and application details may be found at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Intra-University Transfer).

### Former Students

A former student is expected to meet the requirements outlined in Undergraduate Admissions in the General Information section and must reapply to the university. Courses taken at other collegiate institutions are not necessarily a determining factor in the student's readmission to the University of Colorado, but transcripts on all such work must be submitted.

Interruption of studies may require completion of current degree work in addition to repetition of course work for new degree requirements.

## University Of Colorado System Course Equivalencies

The following course-by-course equivalency table should assist in advising students anticipating an intercampus transfer between the Colleges of Engineering and Applied Science within the University of Colorado system. Note there may be credit hour differences between equivalencies, thus students should inquire about credit hours applicable toward degree requirements with their destination major department at the appropriate campus.

<i>CU-Boulder Course</i>	<i>Equivalent Course at CU-Colorado Springs</i>	<i>Equivalent Course at CU-Denver</i>
APPM 1350-4 Calculus 1 for Engineers . . . . .	MATH 135 or (MATH 131 + 132) . . . . .	MATH 1401
APPM 1360-4 Calculus 2 for Engineers . . . . .	MATH 136 . . . . .	MATH 2411
APPM 2350-4 Calculus 3 for Engineers . . . . .	MATH 235 . . . . .	MATH 2421
APPM 2360-4 Differential Equations with Linear Algebra . . . . .	MATH 313 + 340 . . . . .	MATH 3195 or (MATH 3191 + 3200)
CHEM 1211-3 General Chemistry for Engineers . . . . .	CHEM 103* . . . . .	CHEM 1130 or 2031*
CHEM 1221-2 General Chemistry Laboratory . . . . .	CHEM 103* . . . . .	CHEM 2038*
CHEM 3311-3 Organic Chemistry 1 . . . . .	CHEM 331 . . . . .	CHEM 3411
CHEM 3321-1 Organic Chemistry 1 Laboratory . . . . .	CHEM 333 . . . . .	CHEM 3418
CHEM 3331-3 Organic Chemistry 2 . . . . .	CHEM 332 . . . . .	CHEM 3421
CHEM 3341-1 Organic Chemistry 2 Laboratory . . . . .	CHEM 334 . . . . .	CHEM 3428
PHYS 1110-4 General Physics 1 . . . . .	PES 111 . . . . .	PHYS 2311
PHYS 1120-4 General Physics 2 . . . . .	PES 112 . . . . .	PHYS 2331
PHYS 1140-1 Experimental Physics 1 . . . . .	PES 115 or 215 . . . . .	PHYS 2321 + 2341
PHYS 2130-3 General Physics 3 . . . . .	PES 313 . . . . .	PHYS 2811
PHYS 2150-1 Experimental Physics . . . . .	PES 315 . . . . .	PHYS 3711
WRTG 3030-3 Writing on Science and Society . . . . .	ENGL 309 . . . . .	ENGL 3154
AREN 1316-1 Introduction to Architectural Engineering . . . . .	ENGR 1502 . . . . .	None
CVEN 1317-1 Introduction to Civil and Environmental Engineering . . . . .	ENGR 1502 . . . . .	None
CVEN 2012-3 Introduction to Geomatics . . . . .	None . . . . .	CE 2212
CVEN 2121-3 Analytical Mechanics 1 . . . . .	None . . . . .	CE 2121
CVEN 3111-3 Analytical Mechanics 2 . . . . .	None . . . . .	CE 3111
CVEN 3161-3 Mechanics of Materials 1 . . . . .	None . . . . .	CE 3121
CVEN 3313-3 Theoretical Fluid Mechanics . . . . .	None . . . . .	CE 3313
CVEN 3323-3 Hydraulic Engineering . . . . .	None . . . . .	CE 3323
CVEN 3414-3 Fundamentals of Environmental Engineering . . . . .	None . . . . .	CE 3401
CVEN 3424-3 Water and Wastewater Treatment . . . . .	None . . . . .	CE 3414
CVEN 3525-3 Structural Analysis . . . . .	None . . . . .	CE 3505
CVEN 3602-3 Transportation Systems . . . . .	None . . . . .	CE 3602
CVEN 3698-3 Engineering Geology . . . . .	None . . . . .	CE 4780
CVEN 3708 + CVEN 3718 + CVEN 4728 . . . . .	None . . . . .	CE 3708 + CE 4718 + CE 4738
CVEN 4087-3 Engineering Contracts . . . . .	None . . . . .	CE 4087
CVEN 4147-3 Civil Engineering Systems . . . . .	None . . . . .	CE 4077
CVEN 4323-3 Water Resource Engineering Design . . . . .	None . . . . .	CE 4427
CVEN 4537-3 Numerical Methods in Civil Engineering . . . . .	None . . . . .	CE 4537
CVEN 4545-3 Steel Design . . . . .	None . . . . .	CE 4575
CVEN 4555-3 Reinforced Concrete Design . . . . .	None . . . . .	CE 4585
CVEN 4565-3 Timber Design . . . . .	None . . . . .	CE 4565
CSCI 1300-4 Computer Science 1: Programming . . . . .	CS 115 + 206 or ECE 1021 . . . . .	CSC 1410 + CSC 2312
CSCI 2270-4 Computer Science 2: Data Structures . . . . .	CS 145 . . . . .	CSC 2421
CSCI 2400-4 Computer Systems . . . . .	CS 216 . . . . .	CSC 2525
CSCI 2824-3 Discrete Structures . . . . .	None . . . . .	CSC 2511
CSCI 3104-4 Algorithms . . . . .	CS 472 . . . . .	CSC 3412
CSCI 3155-4 Principles of Programming Languages . . . . .	CS 316 . . . . .	CSC 3415
CSCI 3202-3 Introduction to Artificial Intelligence . . . . .	None . . . . .	CSC 4202
CSCI 3287-3 Database and Information Systems . . . . .	CS 442 . . . . .	CSC 4287
CSCI 3308-3 Software Engineering Methods and Tools . . . . .	CS 330 . . . . .	CSC 4508
CSCI 3434-3 Theory of Computation . . . . .	CS 470 . . . . .	CSC 4034
CSCI 3656-3 Numerical Computation . . . . .	CS 460 . . . . .	CSC 4650
CSCI 3753-4 Operating Systems . . . . .	CS 450 . . . . .	CSC 3453
CSCI 4133-3 Security Laboratory . . . . .	None . . . . .	CSC 4740
CSCI 4202-3 Artificial Intelligence 2 . . . . .	CS 482 . . . . .	
CSCI 4229-3 Computer Graphics . . . . .	CS 480 . . . . .	CSC 4565
CSCI 4273-3 Network Systems . . . . .	CS 422 . . . . .	CSC 4761
CSCI 4312-3 Medical Informatics . . . . .	None . . . . .	CSC 4788
CSCI 4448-3 Object-Oriented Analysis and Design . . . . .	CS 302 or CS 304 or CS 306 . . . . .	None
CSCI 4555-3 Compiler Construction . . . . .	CS 410 . . . . .	CSC 4555
CSCI 4593-3 Computer Organization . . . . .	CS 420 . . . . .	CSC 4591
ECEN 1100-1 Freshman Seminar . . . . .	None . . . . .	EE 1201
ECEN 1400-3 Introduction to Digital and Analog Electronics . . . . .	None . . . . .	EE 2651
ECEN 1350-4 C Programming for EE/ECE . . . . .	ECE 1021 . . . . .	None
ECEN 2250-3 Introduction to Circuits and Electronics . . . . .	ECE 2205 . . . . .	EE 2132
ECEN 2260-3 Circuits as Systems . . . . .	ECE 3205 . . . . .	EE 2142
ECEN 2270-3 Electronics Design Laboratory . . . . .	ECE 3205 (lab part) + ECE 3230 + ECE 3240 . . . . .	EE 2552 + EE 3715 + EE 3735
ECEN 2350-3 Digital Logic . . . . .	ECE 1411 + ECE 2411 . . . . .	EE 1510
ECEN 3010-3 Circuits and Electronics for Mechanical Engineers . . . . .	None . . . . .	ME 3030
ECEN 3030-3 Electrical/Electronic Circuits for Non-Majors . . . . .	None . . . . .	EE 3030
ECEN 3170-3 Energy Conversion 1 . . . . .	None . . . . .	EE 3164
ECEN 3250-3 Microelectronics . . . . .	ECE 3210 . . . . .	EE 3215
ECEN 3300-3 Linear Systems . . . . .	None . . . . .	EE 3316
ECEN 3350-3 Programming of Digital Systems . . . . .	ECE 3430 . . . . .	EE 1520
ECEN 3360-3 Digital Design Laboratory . . . . .	ECE 3420 + ECE 3440 . . . . .	EE 4411 + EE 2531
ECEN 3400-3 Electromagnetic Fields . . . . .	ECE 3110 . . . . .	EE 3133
GEEN 1100-3 Social Impact of Technology . . . . .	None . . . . .	ENGR 3400
GEEN 1300-3 Introduction to Engineering Computing . . . . .	None . . . . .	ME 2030
GEEN 1400-3 First-Year Engineering Projects . . . . .	ENGR 1001 . . . . .	None
GEEN 1500-1 Introduction to Engineering . . . . .	ENGR 1502 . . . . .	ENGR 1000
MCEN 1000-1 Introduction to Mechanical Engineering . . . . .	ENGR 1502 or MAE 1502 . . . . .	ENGR 1000

\*Students planning to major in Chemical Engineering, Chemical and Biological Engineering, or Environmental Engineering at CU-Boulder should take:  
CHEM 103 + 106 at the Colorado Springs campus, or  
(CHEM 1130 + 2038) or  
(CHEM 2031 + 2061 + 2038) at the Denver campus.

CU-Boulder Course	Equivalent Course at CU-Colorado Springs	Equivalent Course at CU-Denver
MCEN 1025-3 Computer-Aided Design and Fabrication . . . . .	MAE 2501 . . . . .	ENGR 1025
MCEN 2023-3 Statics and Structures . . . . .	MAE 2101 . . . . .	ME 2023
MCEN 2024-3 Materials Science . . . . .	None . . . . .	ME 3024
MCEN 2063-3 Mechanics of Solids . . . . .	MAE 3201 . . . . .	ME 3043
MCEN 3012-3 Thermodynamics . . . . .	MAE 2301 . . . . .	ENGR 3012
MCEN 3021-3 Fluid Mechanics . . . . .	MAE 3130 . . . . .	ME 3021 or ME 4141
MCEN 3022-3 Heat Transfer . . . . .	MAE 3310 . . . . .	ME 3042
MCEN 3025-3 Component Design . . . . .	MAE 3501 . . . . .	ME 3035
MCEN 3030-3 Computational Methods . . . . .	None . . . . .	ME 3010 or ME 4110
MCEN 3037-2 Experimental Design and Data Analysis . . . . .	MAE 4561 . . . . .	None
MCEN 3043-3 Dynamics . . . . .	MAE 2102 or MAE 2104 . . . . .	ME 2033 or ME 4163
MCEN 4026-3 Manufacturing Processes and Systems . . . . .	None . . . . .	ME 3145
MCEN 4037-2 Measurements Laboratory . . . . .	MAE 3005 . . . . .	ME 3027 + ME 3028
MCEN 4043-3 System Dynamics . . . . .	MAE 3401 or MAE 4421 . . . . .	ME 4023 or ME 4136
MCEN 4045-3 Mechanical Engineering Design Project 1 . . . . .	None . . . . .	ME 4035
MCEN 4047-2 Mechanical Engineering Laboratory . . . . .	MAE 3010 . . . . .	None
MCEN 4085-4 Mechanical Engineering Design Project 2 . . . . .	None . . . . .	ME 4045
MCEN 4122-3 Thermodynamics 2 . . . . .	MAE 3302 . . . . .	ME 3022
MCEN 4123-3 Vibration Analysis . . . . .	MAE 4150 . . . . .	ME 3023
MCEN 4124-3 Mechanical Behavior of Materials . . . . .	None . . . . .	ME 4024
MCEN 4173-3 Finite Element Analysis . . . . .	None . . . . .	ME 4175
MCEN 4183-3 Mechanics of Composite Materials . . . . .	MAE 4155 . . . . .	ME 4114

### Minimum Academic Preparation Standards (MAPS)

All students entering the University of Colorado who finished high school in the spring of 1988 or after must meet Minimum Academic Preparation Standards (MAPS) specified by each school or college. The College of Engineering and Applied Science has adopted the following standards for new students enrolling in the fall semester 2007. These standards are defined in high school units; a unit is one full year of high school course work:

**English**—4 units

**Mathematics**—4 units (includes at least 2 of algebra, 1 of geometry, and 1 of college preparatory math such as trigonometry, analytic geometry, or elementary functions)

**Natural Science**—3 units (includes 1 of physics AND 1 of biology or chemistry; or 2 of chemistry AND 1 of physics or biology; or 2 of biology AND 1 of chemistry or physics)

**Social Science**—3 units

**Foreign Language**—3 of the same foreign language or 2 years in each of two different foreign languages

Students are strongly encouraged to fulfill MAPS requirements prior to entering the College of Engineering and Applied Science. In some cases, students may be admitted even though they have not met all MAPS. If you have a MAPS deficiency, you are required to complete the appropriate MAPS courses prior to your graduation from college through courses taken at CU, other institutions of higher education, or approved credit-by-examination programs. It is the student's responsibility to be aware of any MAPS deficiencies and complete them in a timely manner. The major department has the responsibility to advise the student on which courses must be taken to satisfy any MAPS deficiencies.

For additional information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Advanced Placement and MAPS).

### Enrollment Restrictions

Because of limited space in some degree programs, a student may not have the freedom of choice in majors. Spaces in some majors may be available only on a competitive basis. For specific majors and more information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Enrollment Limited Majors).

### Attendance

Successful work in the College of Engineering and Applied Science is dependent upon uninterrupted attendance in all classes. Students who are unavoidably absent should make arrangements with instructors to make up the work missed. *If students*

*stop attending a course in which they are enrolled, they will receive a failing grade (F) if their overall academic performance, including missed work, is at a failing level.*

If a student misses a final examination because of illness or other valid personal emergency, the student must notify the instructor and the dean's office no later than the end of the day on which the final examination is given. Failure to properly notify these officials may result in an *F* in the course.

### Changing Majors

The form necessary for transferring from one undergraduate engineering major to another and to apply for double-degree programs is available in the dean's office (ECAD 100) and at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Change of Major). A student may not be able to select the desired major because of enrollment limitations or may need to compete for limited major spaces.

### Class Standing

To be classified as a sophomore in the college, a student must have completed 30 semester credit hours; to be classified as a junior, 60 hours; and to be classified as a senior, 90 hours. A student with more than 120 hours is classified as a fifth-year senior. All transfer students are classified on this basis according to their hours of credit accepted at the University of Colorado. This class standing does not necessarily reflect the academic standing of a student in a degree program.

### Credit Policies

#### Advanced Placement

Advanced placement (AP) and college credit may be granted on the basis of the College Entrance Examination Board's (CEEB) Advanced Placement tests. For students who have taken an advanced placement course in high school and who make the required score in the CEEB's Advanced Placement examination, advanced placement and college credit are granted. All advanced placement credit must be validated by satisfactory achievement in subsequent courses, in accordance with the transfer credit policies of the college. For additional information, see [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Advanced Placement and MAPS).

#### College-Level Examination Program Credit

Prospective students may earn college credit on select College-Level Examination Program (CLEP) examinations, provided

that they score at the 67th percentile or above. A list of subjects in which CLEP examinations are accepted may be obtained in the College of Engineering and Applied Science dean's office. All CLEP credit must be validated by satisfactory achievement in subsequent courses, in accordance with the transfer credit policies of the college.

### *Credit for Reserve Officers Training Corps*

Any student may, with departmental approval, receive up to 6 semester hours of credit toward an engineering degree from among Reserve Officers Training Corps (ROTC) courses appearing on the approved Humanities and Social Sciences listing of courses at [engineering.colorado.edu/homer](http://engineering.colorado.edu/homer).

### *Final Grade Appeal*

The college's grade appeal policy may be found at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Appealing a Grade).

### *Incompletes*

The grade of *I* (incomplete) may be given by an engineering faculty member when requested and only with documented circumstances beyond a student's control. A substantial amount of work must have been satisfactorily completed before approval for such a grade is given. If an incomplete grade is given, the instructor is required to document both the conditions precedent to the removal of the incomplete and the time limit for the fulfillment of these conditions. The specified time shall not exceed a one-year period. A copy of the "Incomplete Grade Form" is filed with the dean's office, the student's major department, the instructor, and the student involved.

Course work to complete a grade of *I* must be taken on the same campus on which the grade of *I* was awarded. Credit for a course similar to the course in which the grade of *I* was awarded may not be used to substitute for the incomplete course or be used to remove the grade of *I*.

*If the I grade is not resolved within one year, it reverts to an F.*

### *No Credit Restrictions*

In the College of Engineering and Applied Science, courses required for fulfillment of graduation requirements *cannot be taken for no credit (NC)*. Once a course has been taken for no credit, the course cannot be repeated for credit. Engineering students must petition for approval before enrolling for any course *NC*.

### *Pass/Fail Option*

The primary purpose for offering courses on a *pass/fail* grading option is to encourage students to broaden their educational experience by selecting elective courses with this grade option without serious risk to their academic record. Individual departments may have rules that should be checked before registering for the *pass/fail* option. The college *pass/fail* policy is:

1. The maximum number of credit hours a student may elect with the *pass/fail* option shall be designated by the student's major department, but no more than 16 semester hours of *pass/fail* credit can be applied toward degree requirements. (Study abroad *pass/fail* credit is exempt from this limitation.)
2. It is recommended that a student obtain advance approval from the major department prior to selecting the *pass/fail* option. Course work taken *pass/fail* without appropriate approval may be reverted to the letter grade earned.
3. All students who wish to register for the *pass/fail* option must do so during the university registration or schedule adjustment period.

4. A transfer student may count toward graduation 1 hour of *pass/fail* credit for each 9 credit hours completed in this college.
5. Students on academic probation may not elect the *pass/fail* grade option.

### *Transfer Credit*

After a prospective transfer student has applied and submitted transcripts to the University of Colorado, the Office of Admissions issues a transfer credit evaluation form listing those courses acceptable for transfer by University of Colorado at Boulder standards. A copy of this evaluation is made a part of the student's college record. The appropriate faculty transfer credit evaluator uses this form to indicate which of those courses are acceptable in meeting engineering degree requirements. It is the responsibility of the transfer student to request final validation of the transfer credit hours by the major department and confirm that this validation is noted in the student's college file.

If at any time a student wishes to have a course not previously accepted reconsidered for transfer, the student should consult with the faculty transfer credit evaluator in the major department and petition the dean through the department for approval of the course.

**Nontransferable Credit Hours.** Students desiring to transfer credit hours from engineering technology programs should note that such credit hours are accepted only upon submission of evidence that the work involved was fully equivalent to that offered in this college.

Some technology courses are taught with titles and textbooks identical to those in similar engineering courses. These courses may still not be equivalent to engineering courses because the areas of academic emphasis are divergent.

In order to assist engineering technology students with transfer problems, the following guidelines have been established:

1. Courses on basic subjects such as mathematics, physics, foreign languages, literature, or history may be acceptable for transfer credit if they were taught as part of an accredited program for all students and were not specifically designated for technology students.
2. Students who have taken courses with technology designations that may be valid equivalents for engineering courses have these options:
  - a. They may petition for permission to waive the course requirement. The course requirement can be waived if students demonstrate that, by previous course work, individual study, or work experience, they have acquired the background and training normally provided by the course. No credit is given for a waived course, but students may benefit from the waiver by being able to include more advanced work in their curriculum. Other students may profit by repeating the course at this college and thus establishing a fully sound basis for what follows.
  - b. The appropriate University of Colorado academic department may recommend to the dean's office that credit be transferred to count toward the requirements for a related course in its curriculum. Credit cannot be given for vocational/technical or remedial courses under rules of the university.
  - c. The student may seek credit for the course by examination.

For more information on transfer of credit policies, see Transfer of College-Level Credit in the Undergraduate Admission section.



## Work Experience

It is the academic policy of the College of Engineering and Applied Science that credits accrued in the official records of a student that were awarded for work or co-op experience do not apply toward degree requirements.

## Petition Policy

A student desiring a waiver of college or departmental policies must request and secure approval for this waiver through a petition procedure. Petitions are first presented to the student's major department for review, followed by review at the dean's office. It is the student's responsibility to obtain official notification of the petition decision from the dean's office. Petition forms and information on the petition procedure are available in the dean's office, in the academic department office, or at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Petition Form).

## Registration and Enrollment

To ensure the prompt completion of degree requirements and satisfaction of the four-year guarantee, the undergraduate student is expected to register for, and complete each semester, a full-time course load as outlined in the approved departmental curriculum guide. All students are expected to be enrolled full time and must petition to be enrolled part time. Part-time enrollment (less than 12 credit hours) will negatively impact the student's financial aid and scholarships, and is likely to negatively impact student health insurance, on-campus housing, and the four-year graduation guarantee. Student must also petition to be enrolled in more than 19 credit hours in any given semester.

## Sequence of Courses

Students are expected to follow the curriculum recommended by their major department.

A student who receives a grade of *D+* or lower in a course that is prerequisite to another may not enroll in the succeeding course without an approved petition from the student's major academic department, the instructor of the succeeding course, and the dean's office. (Check with the major department for more stringent requirements.)

All courses are not necessarily offered each semester. According to college policy, undergraduate courses having an enrollment of fewer than 20 students may be cancelled. Students can minimize scheduling problems by closely following the curricular sequence recommended by their major department. If a course is unavailable, a student may petition to enroll for equivalent study.

## Grading System, Pass/Fail, and Drop/Add Procedures

See Registration in the General Information section for the University of Colorado uniform grading system and for additional *pass/fail* option information and drop/add procedures. Specific dates and procedures may be found at [registrar.colorado.edu](http://registrar.colorado.edu).

Only under circumstances beyond the student's control are petitions for dropping courses approved after the drop deadline. Students in their first semester at CU-Boulder may be approved to drop a course through the 10th week of the semester.

## Repetition of Courses

Students are not to register for credit in courses in which they already have received a final grade of *C-* or higher. When students take a course for credit more than once, all grades are used in determining their University of Colorado GPA (unless the Course Reptition Program had been utilized; see [www.colorado.edu/policies/course-repetition.html](http://www.colorado.edu/policies/course-repetition.html)).

A final grade of *F* in a required course necessitates that the course be repeated and a satisfactory final grade attained. Students may not register for credit in any course they have previously completed for no credit (*NC*).

*A student may not enroll more than three times in a course that applies toward degree requirements; furthermore, after the third attempt, a student may not substitute an equivalent course.*

## Summer Courses

An expanded selection of summer session courses is offered for new and continuing students and for those who must remove academic deficiencies. For information about courses, see [www.colorado.edu/summer](http://www.colorado.edu/summer). Students on academic suspension may not register for Maymester courses.

## Withdrawal from the University

Engineering undergraduate students may withdraw only during the first six weeks of the semester. After this time, withdrawals are permitted by this college only upon presentation of evidence to verify that the withdrawal is necessary because of documented conditions clearly beyond the student's control (medical, psychiatric, or extended family emergency).

If a student withdraws, college permission may be required for reenrollment. Students who interrupt their course of study may be required to complete all current degree requirements and to repeat courses previously completed. A student wishing to return after a withdrawal must reapply for admission and is therefore subject to enrollment limits and academic performance evaluation.

## Undergraduate Degree Requirements

Fundamentals taught in the freshman year are of prime importance in the more advanced classes, and every effort is made to place all freshman students in appropriate courses.

It is strongly recommended that students avoid the likelihood of later scheduling problems by carefully following the recommended curriculum in their major or in the open option program.

Each freshman is exposed to a broad university background, completing course work outside the College of Engineering and Applied Science in science, mathematics, social science, and the humanities.

## Advising

All students are advised by faculty and staff from their respective major department or program. Students are encouraged to meet with an advisor at least once a semester.

Advising information is available at the administrative offices of the College of Engineering and Applied Science, ECAD 100, telephone 303-492-5071, directly through the major departments, or at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm).

Advisors are readily available to assist students with academic, vocational, or personal concerns. Students are assigned departmental advisors for academic planning and should consult with the departmental chair or designated faculty or staff representative if there is uncertainty over who is the student's advisor or if the student wants a change in advisor.

## Four-Year Graduation Guarantee

The College of Engineering and Applied Science at the University of Colorado at Boulder is committed to providing an under-

graduate educational experience among the best offered by any comprehensive research university in the country.

The College of Engineering and Applied Science offers 12 bachelor of science degree programs, each of which may be completed within eight full-time semesters. Many students elect to extend their studies at the University of Colorado beyond eight semesters to take advantage of research and employment opportunities, add minor programs, complete double-degree programs, and/or to pursue specialized plans of study.

For new freshmen who do not wish to extend their studies beyond eight semesters, the University of Colorado extends a guarantee that required or essential courses, or acceptable alternative courses, will be available so each student can complete all course work required for a bachelor of science degree from the College of Engineering and Applied Science no later than the end of the eighth consecutive semester of enrollment, when the student follows the degree plan recommended by the major department. In the event the University of Colorado is not successful in meeting the terms of this guarantee, the university will reimburse the student all tuition and course fees for those courses remaining to successfully complete the previously designated bachelor of science degree.

Full details regarding the guarantee and qualifications may be found at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Four Year Guarantee).

### Degree Requirements

1. The BS degree requires that no fewer than 128 semester hours in an acceptable curriculum be completed to the satisfaction of the major department.

The last 45 hours must be earned after admission and matriculation as an undergraduate engineering degree student at the University of Colorado at Boulder campus. Some students will need to present more than the minimum number of credit hours because they may have enrolled in courses that do not apply toward degree requirements.

A student is awarded a degree by the recommendation of the faculty of the College of Engineering and Applied Science after the student's major academic department determines that all degree requirements have been successfully completed.

The diploma indicates the University of Colorado campus from which the department recommending the student for the degree is located. Consideration will generally be given to designating the campus where the majority of the course work was completed. However, the final decision on the campus designation is made by the designated faculty representative from the student's major academic department.

2. The cumulative GPA of an engineering student includes all academic courses attempted at the University of Colorado (unless the Course Repetition Program has been utilized). A cumulative GPA of 2.000 is required in courses used to fulfill degree requirements. In addition, a separately computed GPA of 2.000 must be attained in those courses taken from the student's major department. For students in the engineering physics program, the major department is the physics department.
3. Humanities and social sciences degree requirements may be found at [engineering.colorado.edu/homer](http://engineering.colorado.edu/homer). All electives should be selected with the approval of a faculty advisor and from the lists of approved courses.

Qualified students may take appropriate honors courses for humanities and social sciences credit.

4. Students who graduated from high school in the spring of 1988 and thereafter must complete any minimum academic preparation standards (MAPS) deficiencies prior to graduation. Students should refer to [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Advanced Placement and MAPS) and consult with a faculty advisor or the dean's office (ECAD 100) to determine any MAPS deficiencies and how to satisfy these deficiencies.
5. Some majors require successful completion of an educational outcome measurement prior to graduation. Students should contact their major department to determine whether an outcome measurement is required and when it must be taken.

### Graduation

It is the student's responsibility to be certain that all degree requirements are fulfilled, to notify the major department upon completion of 100 semester hours applicable to BS degree requirements, to fill out the Application for Diploma form at the beginning of the next-to-last semester before graduation, and to keep the departmental advisor and the dean's office informed of any change in graduation plans.

All incompletes must be completed and all Independent Learning course grades must be officially received no later than three weeks prior to the graduation ceremony. It is the student's responsibility to contact the appropriate instructor concerning the removal of incomplete grades. Graduation periods are in December, May, and August.

### Double Degrees

A student in the College of Engineering and Applied Science may be able to obtain bachelor's degrees in two engineering disciplines or one degree in engineering and one in another field, such as business, music, or one of the arts and sciences disciplines. Interested students should come to the dean's office (ECAD 100) for additional information.

#### *Double Degrees from Engineering and Another College*

Arrangements to obtain bachelor's degrees in engineering and in the academic program of another college may be made through consultation with and written approval of the appropriate deans and completion of a minimum of 30 additional semester hours beyond the largest minimum required by either college or school.

#### *Double Degrees within the College of Engineering and Applied Science*

Two bachelor of science degrees in engineering may be earned by obtaining the written approval of both departments concerned and completing a minimum of 30 additional semester hours beyond the largest minimum required by either department. One exception is the dual-degree program in applied mathematics and civil engineering for which the minimum additional semester hours is reduced to 15 (see descriptions in their programs). Transfer students desiring two bachelor's degrees must present a minimum of 75 semester credit hours taken as a student in this college, and must satisfy all other stipulations regarding total hours required and approval of all course work by both departments concerned. Of the 30 additional hours for the second degree, a minimum of 24 shall be in courses offered

by the secondary academic department or in courses approved in advance by the department as substitutes.

Students desiring to pursue a double-degree program must formally designate themselves double-degree candidates by filing a petition signed by the chairs of both departments concerned and the dean before enrolling for the last 30 hours of work to be completed for the double degree.

The decision to earn a double degree should be carefully weighed, since qualified students may be able to obtain a master's degree for a similar number of credit hours (see Graduate Study in Engineering).

### Minors

The college offers minors in applied mathematics, computer science, computer engineering, electrical engineering, signals and systems, and electrical renewable systems.

More information is available at [engineering.colorado.edu/students/advising.htm](http://engineering.colorado.edu/students/advising.htm) (Minor Programs).

### Premedical Option

Several engineering departments have an option by which a student may meet all requirements for entry into medical or other health professions schools while earning a degree in engineering. Engineering departments with this option will approve inclusion of appropriate biological and bioengineering courses in the student's program of technical electives. The courses listed below are usually prescribed by medical and dental schools and must be completed with superior grades.

<i>Required Courses</i>	<i>Semesters</i>
General chemistry . . . . .	2 (with labs)
Organic chemistry . . . . .	2 (with labs)
General biology or zoology . . . . .	2 (with labs)
English composition and literature (at least one of each) . . . . .	2-3
Physics . . . . .	2 (with labs)
Calculus (required or recommended) . . . . .	1
Statistics (strongly recommended) . . . . .	1
Biochemistry (required or strongly recommended) . . . . .	1

Students can typically meet these requirements by carefully substituting electives in their engineering curriculum. Interested students should consult with the prehealth advisor on the Boulder campus early in their undergraduate career in order to accomplish the other elements of preparation for applying to a health professional school. Assistance with requirements for clinical experience and specialized letters of recommendation can be obtained from this office.

### Graduate Work in Business

Undergraduates in engineering who intend to pursue graduate study in business may be able to complete some of the business background requirements as electives in their undergraduate programs. Seniors in engineering who have such intentions and appear likely to qualify for admission to graduate study in business may be permitted to register for graduate fundamentals courses designed to provide qualified students with needed background preparation in business. (See Graduate School information in the Leeds School of Business section.)

In order to take advantage of CU-Boulder's location in one of the country's leading entrepreneurial areas, the Leeds School of Business administers the Deming Center for Entrepreneurship. Both undergraduate and graduate courses are offered, along with an internship program. For information on this joint program, visit [eship.colorado.edu](http://eship.colorado.edu).

### Concurrent BS and MS Degree Program in Engineering

Students with strong academic records who plan to continue in the Graduate School usually find it advantageous to apply for admission to the concurrent BS/MS degree program. Excellent students plan a graduate program beginning in their junior year. The plan provides a small tuition discount for the MS degree and, in many departments, may allow up to 6 credit hours of graduate course work to be applied to the BS degree. This program also provides opportunities to work with faculty on independent study or research projects.

Application is made to the Graduate School through the appropriate academic department. Application and admission may occur during the junior year; consult individual departments for their exact timing. The college requires a minimum GPA of 3.250 for admission to this program; some departments may have higher requirements. Requirements for the two degrees are the same as those for two degrees taken separately: 128 credit hours for the BS degree and 24–30 hours including thesis (Plan I) or 30 credit hours (Plan II) for the MS degree. Up to 6 credit hours of graduate course work may be double counted (i.e., applied toward the BS degree as well as applied toward the MS degree).

All students choose or are assigned a faculty advisor to help them develop a program of study best suited to their interests. Students in each program are encouraged to pursue independent study on research programs or in areas of specialization beyond those offered in formal courses. Students are allowed to structure their senior and graduate years in an order that is optimal for their program, as long as all requirements for both the BS and MS degrees are completed by the end of the concurrent BS/MS program. The BS and MS degrees must be awarded concurrently at the completion of both degree programs.

A minimum GPA of 3.000 must be maintained for continuation in the program; if the GPA falls below 3.000, all hours completed with a passing grade while in the program count only towards fulfillment of the BS degree.

Tuition rates for resident students in this program are usually at the undergraduate rate until requirements for the BS and MS degrees are completed. For additional details on this program, contact the appropriate engineering academic department or the Graduate School.

### Concurrent BS and MS Degree Program in Engineering Physics

The concurrent BS/MS program in engineering physics enables well-qualified and motivated students to experience graduate-level course work earlier in their education and to obtain an MS degree in a reduced time period. Engineering physics majors may apply for this program during their junior year. Applicants should have a minimum GPA of 3.000 at the time of application. The application should be accompanied by recommendation letters from two professors with whom the applicant has taken upper-division physics courses. The applicant should also produce a letter of acceptance from a faculty sponsor/advisor willing to supervise at least 6 credit hours of research. Students interested in this program are encouraged to consult with an engineering physics faculty advisor early in their undergraduate career. Details on course requirements may be found at [www.colorado.edu/physics](http://www.colorado.edu/physics).

## Graduate Study in Engineering

The College of Engineering and Applied Science offers degree programs for the master of engineering (ME), master of science (MS), and doctor of philosophy (PhD) degrees. There are degree programs in each of the following departments or fields:

- aerospace engineering sciences
- chemical and biological engineering
- civil engineering
- computer science
- electrical, computer, and energy engineering
- engineering management
- mechanical engineering
- telecommunications

The master of science in applied mathematics is offered through the Department of Applied Mathematics in the College of Arts and Sciences.

Graduate programs within each engineering department offer a variety of options, providing a number of alternative careers.

The **aerospace program** has a strong emphasis on astrodynamics and satellite navigation systems; bioastronautics; remote sensing, earth, and space science; structural and material systems; and vehicle systems, including aerodynamics, systems, and control.

Key activities in **chemical and biological engineering** include membrane and thin-film science, biomedical engineering and biotechnology, surface science, biofuels and biorefining, polymeric and ceramic materials engineering, microelectronics, nanomaterials, and fluids.

Fields emphasized in **civil engineering** include geotechnical engineering and geomechanics, structural mechanics and engineering, building systems engineering, construction management and engineering, environmental and geoenvironmental engineering, hydrology, environmental fluid mechanics, civil engineering systems, and engineering science.

Strengths in **computer science** include computer architecture, operating systems, networking, mobile computing, computer security, computational biology, robotics, algorithm design, artificial intelligence, software and web engineering, programming languages, database design and data mining, human-computer interaction, computer-supported cooperative work, machine learning, lifelong learning and design, numerical and parallel computation, speech and language processing, scientific computing, and theoretical computer science.

Areas of focus in **electrical, computer, and energy engineering** include photovoltaic, wind, and renewable energy systems, power machines and systems, electromagnetic theory, microwave and optical guided wave devices, antennas, remote sensing, biomedical engineering, communications and signal processing, medical imaging, computer architecture and software optimization, optical devices, optoelectronics, nanomaterials and nanodevices, biophotonics, robotics, man/machine interfaces, high-performance autonomous vehicles, and computer aided design for VLSI.

**Engineering management** offers a core management curriculum in leadership, project management, quality, and finance. Areas of concentration are available in managing innovation, project management, performance excellence, engineering entrepreneurship, quality systems, software management, and Six Sigma methodologies. These courses are designed for engineers and technical professionals preparing for management assignments in high-technology fields.

**Mechanical engineering** areas of concentration include biomedical engineering, combustion science, air quality, environmental engineering, heat transfer, energy conversion, materials science/

engineering, design and manufacturing, electronic packaging, micro-electro-mechanical systems (MEMS), nanotechnology, biomedical devices, pollution prevention, nondestructive structural evaluation, wave propagation and scattering, solid mechanics, fluid mechanics, and mechatronics and robotics.

**Telecommunications** offers an interdisciplinary master's degree program that integrates courses in electrical engineering, computer science, business, economics, policy, and law. Through such an approach, and access to its world-class telecommunications laboratory, students are equipped to design, plan, analyze, and manage telecommunications systems, networks, and the many advanced and innovative uses of interactive communications today. Students enter the program from a wide variety of technical or liberal arts undergraduate degrees and expand their knowledge through an individually tailored combination of courses from the various disciplines that meet the criteria for the degree. This ensures balanced, specialized capabilities necessary for a comprehensive understanding of the technological and socio-cultural aspects of telecommunications, including voice systems, wireless networks, and the Internet.

### Graduate Degree for Science Majors

Science graduates who have good academic records and strong backgrounds in mathematics and science may be eligible for admission as graduate students in engineering or may be able to qualify with some extra course work. Information may be obtained from the appropriate academic department office.

### Distance Learning and Professional Development Programs

The Center for Advanced Engineering and Technology Education (CAETE) is the distance learning and professional studies arm of the College of Engineering and Applied Science. CAETE provides convenient and flexible education for working professionals. Courses are delivered in the campus classroom and via the Internet to students across the country and abroad.

Graduate credit courses are available in the areas of aerospace engineering; computer science; electrical, computer, and energy engineering; civil, environmental, and architectural engineering; engineering management; and telecommunications. Course sequences may lead to a graduate certificate or master's degree.

Noncredit courses are available in such fields as database administration, networking, project management, sustainability, and other engineering and technical areas. Course sequences may lead to a certificate or continuing education units (CEUs).

Students may enroll in credit courses before being accepted to the Graduate School, but they should apply for admission before finishing a third course. Courses taken before admission are considered transfer credit. Nine transfer credit hours will be accepted toward a graduate degree program. All applicable courses taken after admission will count toward the degree. Nondegree students may register for credit or noncredit courses for professional development.

CAETE also provides ongoing access to over 100 pre-recorded courses via a virtual library. These courses are available for academic course work, rental, or purchase by companies and individuals for in-house training.

For more information, visit the CAETE website at [caete.colorado.edu](http://caete.colorado.edu), call 303-492-6331, e-mail [caete@colorado.edu](mailto:caete@colorado.edu), or write to CAETE, University of Colorado at Boulder, 435 UCB, Boulder, CO, 80309-0435.

## Master of Engineering, Master of Science, and Doctor of Philosophy

Students wishing to pursue graduate work in engineering leading to candidacy for advanced degrees should read carefully the requirements for advanced degrees in the Graduate School section. Some departments also have available explanatory material on their advanced degree programs.

**Prerequisites.** To enroll for an advanced degree in any department of the College of Engineering and Applied Science and the interdisciplinary telecommunications program, candidates either must have previously earned a bachelor's degree in a curriculum that includes the necessary prerequisites for that branch of engineering or must qualify for the concurrent BS and MS program. If the candidate's preliminary education was taken at some other institution, the degree of qualification for advanced work is determined by the department concerned and by the dean of the Graduate School.

Graduates of engineering technology programs should note that the equivalent of a BS degree in an appropriate engineering field is required for entry into the Graduate School. Because the goals and orientation of engineering programs differ from those of technology programs, technology graduates should expect to make up deficiencies before being admitted to graduate study in engineering. Students may not be admitted to the Graduate School while making up deficiencies, but can enroll as non-degree students.

For admission as a regular degree student, an undergraduate GPA of at least 3.000 is normally required.

**Language Requirement.** PhD candidates should note that some engineering departments have foreign language requirements.

**Course Work.** Graduate work in each department of the College of Engineering and Applied Science falls into two classes:

1. Courses that are offered for candidates who have chosen to major in the particular department
2. Courses that are offered for candidates who have chosen their major in some other department, but who are pursuing a certificate or other complementary course work

Graduate students majoring in any department may not use toward graduate degrees those courses listed as required undergraduate work in the same department. They may, however, use up to 6 hours taken at the 3000–4000 level toward a master's degree. These course must be taken from an engineering department other than that in which they received their bachelor's degree, and must have the approval of the department granting the degree and the dean of the Graduate School.

**Availability of Courses.** All courses are not necessarily offered every year. They are available only if there is sufficient demand.

**Qualifying Examinations.** Graduate students who plan to become candidates for the MS or PhD degree may be required to take a qualifying examination in the appropriate field of specialization during the first semester in which they are registered as candidates for a graduate degree. Individual departments should be consulted concerning the timing or requirement of this examination. The purpose of this examination is to enable the advisor and student to plan a suitable program of study.

## Teaching Assistant English Proficiency and Intelligibility

The College of Engineering and Applied Science requires that all graduate teaching assistants be proficient and intelligible in spoken English. In order to ensure that this is the case, all prospec-

tive teaching assistants whose native language is not English, or others for whom the department graduate program coordinator believes that spoken language intelligibility is a concern, regardless of native language, will be tested for spoken language intelligibility prior to or at the beginning of the semester in which the teaching assistantship is awarded. In the event that a prospective teaching assistant does not demonstrate a satisfactory level of proficiency, as determined by the Graduate Education Council of the College, that student will be required to participate in training designed to improve intelligibility.

## Aerospace Engineering Sciences

The undergraduate curriculum, Aerospace Curriculum 2000, was developed in consultation with students, faculty, staff, alumni, and employers. The curriculum's stated Educational Objectives and Desired Outcomes are as follows:

### *Educational Objectives*

During their first three to five years after graduation, Aerospace Engineering Sciences graduates will have:

- established themselves in distinguished professional careers or received a graduate degree;
- demonstrated leadership, management, or entrepreneurial skills; and
- played key roles in the design of complex aerospace systems.

### *Desired Outcomes*

Students completing the undergraduate degree in aerospace engineering will be knowledgeable in the following areas:

- the professional context of the practice of aerospace engineering and expectations of new graduates in aerospace engineering organizations, including an awareness of ethics issues, economics, and the business environment;
- the history of aerospace engineering, providing a perspective on current events;
- aerospace engineering as a highly multidisciplinary endeavor, requiring a systems perspective to integrate technologies and manage complexity; and
- major principles and scientific methods underlying the technologies comprising aerospace vehicles and systems.

Upon graduation, students will have developed the following general skills and abilities:

- written, oral, and graphical communication skills;
- an ability to quantitatively estimate, model, analyze, and compute;
- an ability to define and conduct experiments using modern laboratory instruments, and to interpret experimental results;
- an ability to seek out and gather information, enabling independent and lifelong learning;
- interpersonal and organizational skills that enable individuals to work effectively in teams and assume leadership positions;
- an ability to identify needs, requirements, and constraints, and to design appropriate reliable engineering solutions;
- an ability to formulate technical problems clearly, and to correctly apply appropriate methods and procedures for their solution;

- an ability to program computers, and skills in the use of modern engineering analysis, simulation software, and operating systems; and
- an ability to understand societal needs, business issues, and the ethical concerns and responsibility of the industry.

## Bachelor's Degree Requirements

The undergraduate curriculum, Aerospace Curriculum 2000, is designed to prepare students to advance to a distinguished professional career in the aerospace industry or for graduate school, consistent with our stated Program Educational Objectives. In particular, this involves providing students with an interdisciplinary systems perspective of aerospace engineering. The curriculum accomplishes these goals by:

- providing a strong basis in mathematics, science, and engineering fundamentals;
- extending these fundamentals to advanced topics in aerospace engineering;
- complementing the engineering education with sufficient exposure to the humanities and social sciences; and
- beginning and ending in major design experiences that stress an interdisciplinary systems perspective.

AES students are also encouraged to consider a technical minor or double major in electrical engineering, computer science, applied math, engineering physics, astrophysical and planetary sciences, or atmospheric and oceanic sciences. In most cases, the junior- and senior-level courses required for the above-mentioned minors can be applied to the professional area elective requirements.

For students having sufficient ability and interest, planning for graduate study should begin by the start of the junior year. Such a plan should consider the foreign language requirements of appropriate graduate schools and an advanced mathematics program. Students who wish to combine the business and aerospace engineering sciences curricula are advised to consider obtaining the BS degree in aerospace and a master's degree in business rather than a combined BS degree. Space in the undergraduate aerospace engineering program is limited; some restrictions may apply.

### Bioengineering Option/Premedical Curriculum

These courses have been specifically designed for students who wish either to attend medical school or to enter graduate work in bioengineering after receiving the BS degree. Students should consult their advisor regularly to assure the adequacy of their curricula.

### Curriculum for BS, Aerospace Engineering Sciences

The BS curriculum in aerospace engineering sciences is revised annually to keep up with new advances in technology, to make use of new educational methodologies, and to satisfy updated program accreditation criteria. The following curriculum requirements are those in effect at the time this catalog was printed.

#### Required Courses

#### Semester Hours

##### Freshman Year

###### Fall Semester

APPM 1350 Calculus 1 for Engineers . . . . .	4
CHEM 1221 General Chemistry Lab for Engineers . . . . .	2
CHEM 1211 Engineering General Chemistry . . . . .	3
GEEN 1400 Engineering Projects . . . . .	3
Humanities or social science elective . . . . .	3

##### Spring Semester

APPM 1360 Calculus 2 for Engineers . . . . .	4
PHYS 1110 General Physics 1 . . . . .	4
Computing requirement (GEEN 1300 or equivalent) . . . . .	3
Humanities or social science elective . . . . .	3

##### Sophomore Year

###### Fall Semester

APPM 2350 Calculus 3 for Engineers . . . . .	4
ASEN 2001 Aerospace 1: Introduction to Statics, Structures, and Materials . . . . .	5
ASEN 2002 Aerospace 2: Introduction to Thermodynamics and Aerodynamics . . . . .	5
Humanities or social science elective . . . . .	3

###### Spring Semester

APPM 2360 Introduction to Differential Equations with Linear Algebra. . . . .	4
ASEN 2003 Aerospace 3: Introduction to Dynamics and Systems . . . . .	5
ASEN 2004 Aerospace 4: Aerospace Vehicle Design and Performance . . . . .	5
Humanities or social science elective (upper-division) . . . . .	3

##### Junior Year

###### Fall Semester

ASEN 3111 Aerodynamics . . . . .	4
ASEN 3112 Structures . . . . .	4
ASEN 3113 Thermodynamics and Heat Transfer. . . . .	4
PHYS 1120 General Physics 2 . . . . .	4

###### Spring Semester

ASEN 3128 Aircraft Dynamics . . . . .	4
ASEN 3200 Orbital Mechanics/Attitude Determination and Control . . . . .	4
ASEN 3300 Electronics and Communications . . . . .	4
WRTG 3030 Writing on Science and Society (or WRTG 3035 or HUEN 3100) . . . . .	3
Humanities or social science elective (upper-division) . . . . .	3

##### Senior Year

###### Fall Semester

ASEN 4012 Aerospace Materials . . . . .	3
ASEN 4018 Senior Projects 1: Design Synthesis . . . . .	4
Free elective . . . . .	3
Professional area electives. . . . .	6

###### Spring Semester

ASEN 4013 Foundations of Propulsion . . . . .	3
ASEN 4028 Senior Projects 2: Design Practicum. . . . .	4
Free elective . . . . .	2
Professional area elective . . . . .	6

### Humanities and Social Science Electives

Courses selected must meet humanities and social science requirements as detailed at [engineering.colorado.edu/hss](http://engineering.colorado.edu/hss).

### Professional Area Electives

1. Any ASEN course at the 3000 level or above that is not a required course can be used as a professional area elective.
2. A professional area elective is generally a course in math, engineering, or science at the 3000-level or above. Elective courses most likely to help an aerospace engineer's career development are ASEN, math, CSCI, ECEN, and physics courses. It is suggested that students secure advance approval for professional area elective courses from their advisor.
3. Independent study or undergraduate research is acceptable for up to 6 credit hours of professional area elective credit. The upper-division ROTC courses AIRR 3010, NAVR 3030, and NAVR 3040 are acceptable for 3 semester hours of professional area elective credit.

### Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite for another required course is C. If a grade of C- or lower is received in a course which is a prerequisite to another, the student may not register for the subsequent course until the first grade has been raised to a C or higher.

The minimum passing grade for a course that is not specifically a prerequisite for another required course is *D-*.

The AES department reserves the right to drop students enrolled in ASEN courses that have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the department if summer course work and/or transfer credit will be used to meet the prerequisite requirement.

## Graduate Degree Programs

The Department of Aerospace Engineering Science at the University of Colorado is one of the top aerospace engineering departments in the nation with annual research expenditures that exceed \$10 million. Aerospace engineers work on Earth and in space not only to extend frontiers but also to understand more fully and to preserve our terrestrial environment. Few fields offer more exciting and diverse careers: becoming an astronaut (15 graduates to date have become astronauts), designing the next generation of aircraft and spacecraft, monitoring our global habitat via remote sensing from space, in situ sensing with unmanned vehicles, and helping to develop environmentally clean energy and transportation systems.

Aerospace graduate students often formulate degree plans on the basis of the student's interests and needs. Portions of the program are designed to promote the student's engineering and professional development. Graduate students are admitted into a specific focus area that provides research advising, financial support, and sets specialized admission and program requirements and recommendations for course work within and outside the department. The four focus areas are:

- Aerospace Engineering Systems
- Astrodynamics and Satellite Navigation Systems
- Bioastronautics
- Remote Sensing, Earth and Space Science

Each focus area has defined the required characteristics of its successful graduates at the MS and PhD level, and defined the required and elective courses that support its educational program.

Aerospace-related research centers in the college include the Colorado Center for Astrodynamics Research, the Center for Aerospace Structures, the Research and Engineering Center for Unmanned Vehicles, and Bioserve Space Technologies (a NASA Center for the Commercial Development of Space). Other research centers within the university that are involved in space-related research activities are the Center for the Study of Earth from Space, the Center for Astrophysics and Space Astronomy, the Laboratory for Atmospheric and Space Physics, JILA, and the Cooperative Institute for Research in Environmental Sciences.

### Requirements for Advanced Degrees

Graduate students applying for admission to aerospace engineering sciences are required to submit the results of the analytical, quantitative, and verbal sections of the general examination, Graduate Record Examination (GRE).

The department offers graduate programs leading to the master of engineering, and the MS and PhD degrees in aerospace engineering sciences. Degree plans often are formulated on the basis of the student's interest and needs. Portions of the program are designed to promote the student's engineering and professional development.

Courses below the 5000 level in aerospace engineering cannot count toward graduate degree requirements; up to 6 credits at 4000 level relevant courses from approved departments outside aerospace may be accepted for master's degree credit if

they fit with the student's degree plan. Such courses must have academic content consistent with graduate study in aerospace engineering sciences.

**Advising.** Once students have selected a research area for the thesis, academic advising is done by their thesis advisor.

### Master of Science Degree

#### (Plan I/II)

A total of 30 semester hours (including both course and thesis hours), at least 24 semester hours of which must be completed at the 5000 level or above, and no more than 12 semester hours can be outside of ASEN.

Two to four required courses (6–12 semester hours) must be taken in the student's primary focus area and one course (3 semester hours) must be taken in a second focus area.

Two graduate level math courses (6 semester hours) in ASEN or APPM  
Students may take a 6000 level seminar for credit only once (1 semester hour).  
Students may take a 7000 level seminar (where they present research) once (2 semester hours).

Students must complete a project (6 semester hours) consisting of either (1) MS thesis (Plan I), (2) two semesters of independent study (Plan II), or (3) a two-semester team projects course (Plan II). Each project culminates with an oral presentation and or written report or oral examination (in the case of the MS thesis). A "pass" on the MS defense or a B- or higher for both semesters of independent study or projects is required for successful completion of the MS. MS independent study may have a written and/or oral report requirement at the discretion of the faculty advisor.

Completion of all degree requirements within four years of the date of commencing course work, normally completed in one to two years.

Master's degree residence requirements can be met only by residence on the CU-Boulder campus for two semesters or three summer sessions, or a combination of at least one semester and two summer sessions.

Pass all ASEN courses with a grade of B- or better.

### Master of Engineering Degree

Students may elect to enroll for a Master of Engineering Degree rather than a Master of Science degree, typically for one of the following reasons:

- A CAETE student is interested in a course work only program.
- A student desires a more flexible and customized degree program (e.g., incorporating business courses) and does not wish to follow any focus area curriculum.

#### Master of Engineering Requirements

A total of 30 credit hours, with at least 15 credits in ASEN at the 5000 level or above.

Completion of all degree requirements within six years of the date of commencing course work.

Master's degree residence requirements can be met only by residence on the CU-Boulder campus for two semesters or three summer sessions, or a combination of at least one semester and two summer sessions.

Pass all ASEN courses with a grade of B- or better.

### PhD Degree

**Course Requirements.** A minimum of 36 semester credit hours of courses numbered 5000 or above (at least 18 of these must be in ASEN) with a minimum of 3.250 GPA, and 30 credit hours of thesis credit are required for the degree. A maximum of 21 credit hours may be transferred from another accredited institution and applied toward a PhD degree if approved by the graduate committee of the department and the Graduate School. All courses taken for the master's degree at the 5000 level or above at the University of Colorado may be applied toward the doctoral degree at the university. The formal course work must include a minimum of 18 hours of courses or their equivalent in aerospace engineering sciences.

**Preliminary Examination.** Students must pass a preliminary examination by no later than the end of the third semester, administered by a committee consisting of three regular or research faculty members, two of whom must be from the student's main focus area and the third from a secondary focus area. The exam will include a written and an oral element, as determined, prepared, and evaluated by the exam committee.

**Comprehensive Examination.** By no later than the fifth semester, students must also pass an oral examination before the student's doctoral committee of five or more graduate faculty members chosen by the student and approved by the department and the Graduate School. This should be preceded by individual examinations or interviews, either written or oral or both, by every committee member. The oral examination before the committee is based primarily on a written proposal for the thesis research provided by the student to committee members in advance.

**PhD Thesis.** Students must write a thesis based on original research conducted under the supervision of a graduate faculty member. The thesis must fulfill all Graduate School requirements. After the thesis is completed, an oral final examination on the thesis and related topics is conducted by the student's doctoral committee.

## Applied Mathematics

The Department of Applied Mathematics in the College of Arts and Sciences offers a BS degree in applied mathematics through the College of Engineering and Applied Science. The BS degree is designed to prepare graduates for exciting and diverse professional careers, and for graduate study in a wide variety of disciplines. The department also offers both an MS degree and a PhD degree through the Graduate School.

The objectives of the Department of Applied Mathematics at CU-Boulder are summarized below:

- provide undergraduate and graduate students with high-quality education and training in applied mathematics, and prepare them for careers in industry, laboratories, and the academic professions;
- offer and monitor degree programs leading to BS, MS, and PhD degrees in applied mathematics;
- nourish and maintain a professional environment in which excellence in teaching, learning, scholarship, and creativity are of central importance;
- assure teaching and research expertise in a number of key areas of applied mathematics including the methodology of applied mathematics, computational mathematics and algorithms, industrial applications, mathematical biology, applied probability, and statistics.

Courses at the undergraduate level provide training in a broad range of mathematical techniques and problem-solving strategies. These courses teach the concepts and methods central to applications of linear algebra, ordinary and partial differential equations, numerical analysis, probability and statistics, complex variables, and nonlinear dynamics. Since applied mathematicians often are involved in interdisciplinary work, the BS degree requires an in-depth knowledge of some area of science or engineering where mathematics is used. This knowledge prepares graduates to successfully communicate and cooperate with engineers and scientists. The BS degree also requires knowledge of a programming language and skill in using the computer.

## Desired Outcomes

The undergraduate degree in applied mathematics emphasizes knowledge and awareness of:

- differential and integral calculus in one and several variables;
- vector spaces and matrix algebra;
- ordinary and partial differential equations;
- at least one programming language;
- at least one application software package in either mathematics or statistics;
- methods of complex variables as used in applications; and
- numerical solutions of linear and nonlinear problems.

In addition, students completing a degree in applied mathematics acquire:

- an in-depth knowledge of an area of application (an engineering discipline or a natural science field or one of the quantitative areas of business and economics);
- knowledge of problem-formulation, problem-solving, and modeling techniques and strategies central to applications; and
- the ability to clearly and concisely, and in oral and written forms, communicate analytic arguments.

## Minor Program

The department also offers a minor in applied mathematics that is available to engineering as well as to arts and sciences students. A minor in applied mathematics indicates that a student has received in-depth training in mathematical techniques and computational methods well beyond the training usually received by science and engineering majors.

## Concurrent BS/MS Degree Program

The concurrent BS/MS program in applied mathematics enables well-qualified and motivated students to experience graduate-level course work earlier in their education and to obtain an MS degree in a reduced time period. Applied math majors may apply for this program during their junior year. Minimum requirements for admission include completion of at least two APPM courses numbered 3000 or higher, an overall GPA of 3.400 or higher, a minimum GPA of 3.400 in APPM and MATH courses, and two letters of recommendation from APPM faculty. Students interested in this program are encouraged to consult with an applied mathematics faculty advisor early in their undergraduate career.

## Bachelor's Degree Requirements

The BS degree in applied mathematics requires the completion of a minimum of 128 credit hours of acceptable course work with cumulative and major grade point averages of C or better. Students must complete the following minimum requirements:

1. Three semesters of calculus (APPM 1350, 1360, and 2350) with a minimum grade of C- in each course.
2. Computing experience (CSCI 1300 or GEEN 1300 or APPM 2750).
3. Science requirement: completion of PHYS 1110, 1120, and 1140. Completion of at least 5 additional credits of chemistry or biology (including 2 credits of laboratory science), chosen from one of the following: CHEM 1221 and CHEN 1211; CHEM 1151; EBIO 1210, 1220, 1230, and 1240; or MCDB 1150, 1151, 2150, and 2151.



4. Completion of the following required applied mathematics courses: APPM 2360; APPM 3310; APPM 4350 and 4360; APPM 4650; and APPM 4440 or MATH 3001 or 3140.
5. A two-semester course sequence of applied mathematics or mathematics courses numbered 4000 or above in addition to APPM 4350 and 4360 (for example, APPM 4380 and 4390, APPM 4440 and 4450, APPM 4570 and 4580, APPM 4560 and 4520, APPM 4650 and 4660, or APPM 3570 and either APPM 4520 or 4560). NOTE: APPM 3570 is the only 3000-level course that can be used to satisfy this requirement.
6. A minimum of 24 credit hours in applied mathematics or mathematics courses numbered 3000 or above (including the required courses). No more than 3 credits of APPM 4840 may count toward these 24.
7. A minimum of 24 credit hours in engineering courses (or approved courses with a significant mathematical content in arts and sciences or business) with at least 15 credit hours in courses numbered 2000 or above and at least 6 credit hours in courses numbered 3000 or above. These 24 credit hours are in addition to those required credit hours listed in numbers 2 and 3 (mentioned above). HUEN 3100, 3200, 4100, and 4200 may not be used to fulfill this requirement, although they may be used as social and humanistic electives. Several possible options are listed separately.
8. The general bachelor's degree requirements of the College of Engineering and Applied Science (18 credit hours of social and humanities electives that include WRTG 3030, a writing course offered through the University Writing Program). Students may take HUEN 3100 in place of WRTG 3030. Humanities and social science electives must not be limited to a selection of unrelated introductory courses. At least 9 credit hours must be at an advanced level (3000 or above). The 3-credit WRTG or the 3-credit HUEN can be used toward the requirement of at least 9 credits at the 3000 level.

**Some Recommended Options for Applied Math Majors**

**Aerospace Engineering Sciences Option**

Recommended courses (total of 20 credit hours):

ASEN 2001 Aero 1: Introduction to Statics, Structures, and Materials . . . .	5
ASEN 2002 Aero 2: Introduction to Thermodynamics and Aerodynamics . .	5
ASEN 2003 Aero 3: Introduction to Dynamics and Systems . . . . .	5
ASEN 2004 Aero 4: Introduction to Vehicle Design and Performance. . . .	5

At least two more ASEN courses at the 3000 level or above

*Advising Note: Students seeking to enroll in ASEN courses must register through an aerospace advisor.*

**Chemical Engineering Option**

Recommended courses (total of 21 credit hours):

CHEM 1221 and CHEM 1211 . . . . .	5
CHEM 2120 Material and Energy Balance. . . . .	3
CHEM 3200 Fluids. . . . .	3
CHEM 3210 Heat Transfer . . . . .	3
CHEM 3220 Mass Transfer . . . . .	3
CHEM 3320 Thermodynamics. . . . .	3
CHEM 4330 Reaction Kinetics. . . . .	3
CHEM 4511 Physical Chemistry . . . . .	3

Also recommended:

APPM 4570 Statistical Methods . . . . .	3
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*Note: One additional course is required to bring the total number of credits to at least 24.*

**Computer Science Option**

Recommended courses (total of 4 credit hours):

CSCI 2270 Data Structures (prereq. CSCI 1300) . . . . .	4
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Additional courses to bring the total number of credits to at least 24; at least two of these must be at the 3000 level. Possible choices include:

CSCI 3104 Algorithms . . . . .	4
CSCI 3155 Principles of Programming Languages . . . . .	4
CSCI 3287 Database Systems . . . . .	3
CSCI 3753 Systems. . . . .	4
ECEN 2120 Computers as Components . . . . .	5
ECEN 3100 Digital Logic . . . . .	5

*Advising Note: Students completing the computer science option should have a minor in computer science. Check with the computer science department.*

**Electrical and Computer Engineering Option**

Students interested in this option should consult with an advisor as several areas are available (computer engineering, electrical engineering, signals and systems, and electrical renewable energy systems). A minimum of 24 credit hours is required.

**Engineering Physics Option**

Recommended courses after first-year physics (22 or 23 credit hours):

PHYS 2150 Experimental Physics . . . . .	1
PHYS 2170 Foundations of Modern Physics . . . . .	3
PHYS 2210 Classical Mechanics and Math Methods 1 . . . . .	3
PHYS 3210 Classical Mechanics and Math Methods 2 . . . . .	3
PHYS 3220 Quantum Mechanics and Atomic Physics. . . . .	3
PHYS 3310 Principles of Electricity and Magnetism 1 . . . . .	3
PHYS 3320 Principles of Electricity and Magnetism 2 . . . . .	3

Plus either of the following:

PHYS 3330 Junior Laboratory. . . . .	2
PHYS 4230 Thermodynamics and Statistical Mechanics . . . . .	3

*Note: Additional courses are required to bring the total number of physics credits to 24.*

Also recommended:

APPM 3570 Applied Probability . . . . .	3
MATH 3140 Abstract Algebra 1 . . . . .	3

*Advising Note: Students completing the physics option should have a minor in physics. Check with the physics department.*

**Mechanical Engineering Option**

Recommended courses (total of 24 credit hours):

MCEN 2023 Statics and Structures . . . . .	3
MCEN 2063 Mechanics of Solids . . . . .	3
MCEN 3012 Thermodynamics . . . . .	3
MCEN 3021 Fluid Mechanics. . . . .	3
MCEN 3022 Heat Transfer . . . . .	3
MCEN 3025 Component Design . . . . .	3
MCEN 3043 Dynamics . . . . .	3
MCEN 4043 System Dynamics . . . . .	3

Also recommended:

APPM 4570 Statistical Methods . . . . .	3
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**Civil, Environmental, and Architectural Engineering Option**

Recommended basic courses (total of 12 credit hours):

AREN 2110 Thermodynamics. . . . .	3
CVEN 2121 Analytical Mechanics 1 . . . . .	3
CVEN 3161 Mechanics of Materials 1 . . . . .	3
CVEN 3313 Theoretical Fluid Mechanics . . . . .	3

Students also take two courses from any one of the following groups:

- a) AREN 2406 Introduction to Building Construction . . . . . 3
  - AREN 3010 Mechanical Systems for Building . . . . . 3
  - AREN 3540 Illumination 1 . . . . . 3
- b) CVEN 3414 Introduction to Environmental Engineering . . . . . 3
  - CVEN 4333 Engineering Hydrology . . . . . 3
- c) CVEN 3525 Structural Engineering 1. . . . . 3

CVEN 3708 Geotechnical Engineering 1 . . . . .	3
CVEN 4555/4545 Reinforced Concrete Design/Steel Design . . . . .	3

### Actuarial Option

Recommended basic courses (23 credit hours):

BCOR 2000 Accounting and Financial Analysis 1 . . . . .	4
BCOR 2200 Accounting and Financial Analysis 2 (formerly 2100) (Note 1) . . . . .	3
FNCE 3010 Corporate Finance . . . . .	3
ECON 1000 Introduction to Economics . . . . .	4
ECON 3070 Intermediate Microeconomics Theory . . . . .	3
ECON 3080 Intermediate Macroeconomics Theory . . . . .	3
ECON 4818 Introduction to Econometrics . . . . .	3

Some of the following courses should also be taken:

ACCT 3220 Intermediate Financial Accounting 1 . . . . .	3
ACCT 3230 Intermediate Financial Accounting 2 . . . . .	3
BCOR 3000 Business Law, Ethics, and Public Policy . . . . .	3
FNCE 3020 Financial Markets and Institutions . . . . .	3
FNCE 4040 Derivative Securities . . . . .	3

### Curriculum Notes

1. *BCOR 1020 Business Statistics is a prerequisite for BCOR 2200 (formerly 2100). Students are advised to substitute an applied math probability/statistics course for this prerequisite.*
2. *ECON 1000 may not count toward the 24 credits of the option requirement; however, ECON 1000 can be used to meet the 18-credit social science/humanities requirement of the College of Engineering.*
3. *Students are advised, but not required, to take as many of the following courses as possible as part of their applied math requirement: APPM 3570, 4520, 4540, and 4560.*
4. *To assure admittance into Leeds School of Business courses, students should apply to the Actuarial Studies and Quantitative Finance Certificate Program.*

### Finance Option

Recommended basic courses (14–16 credit hours):

BCOR 2000 Accounting and Financial Analysis 1 . . . . .	4
BCOR 2200 Accounting and Financial Analysis 2 (formerly 2100) (Note 1) . . . . .	3
ECON 2010 Principles of Microeconomics and ECON 2020 Principles of Macroeconomics (Note 2) or ECON 1000 Introduction to Economics (Note 3), 3070 Intermediate Microeconomics Theory and 3080 Intermediate Macroeconomics Theory . . . . .	6-9
FNCE 3010 Corporate Finance . . . . .	3

Plus at least two of the following courses to meet the 24 credit-hour requirement of the option:

FNCE 4000 Financial Institutions Management . . . . .	3
FNCE 4020 Applied Business Finance . . . . .	3
FNCE 4030 Investment and Portfolio Management . . . . .	3
FNCE 4040 Derivative Securities . . . . .	3
FNCE 4050 Capital Investment Analysis . . . . .	3
FNCE 4060 Special Topics in Finance . . . . .	variable credit

### Curriculum Notes

1. *BCOR 1020 Business Statistics is a prerequisite for BCOR 2200 (formerly 2100). Students are advised to substitute an applied math probability/statistics course for this prerequisite.*
2. *ECON 2010 and 2020 should be taken in either the first or the second year. They do not count toward the 24 credits of the option requirement, but they can be used to meet the 18-credit social science/humanities requirement of the College of Engineering.*
3. *ECON 1000 may not count toward the 24 credits of the option requirement; however, ECON 1000 can be used to meet the 18-credit social science/humanities requirement of the College of Engineering.*
4. *To assure admittance into Leeds School of Business courses, students should apply to the Actuarial Studies and Quantitative Finance Certificate Program.*

### Computational Biology and Bioinformatics Option

The following concentration of selected courses from computer science, biology, and chemistry provide the foundation for work in mathematical biology, computational biology, and/or bioinformatics.

### Required Courses

### Semester Hours

CSCI 2270 Data Structures (Note: CSCI 1300 is a prerequisite for CSCI 2270.) . . . . .	4
CHEM 331 and 3321 Organic Chemistry 1 and Lab . . . . .	5
CSCI 4314 Algorithms for Molecular Biology . . . . .	3
MCDB 1150 and 1151 Introduction to Cellular and Molecular Biology and Lab . . . . .	4
MCDB 2150 and 2151 Principles of Genetics and Lab . . . . .	4
MCDB 3120 and 3140 Cell Biology and Lab . . . . .	5
MCDB 3500 Molecular Biology . . . . .	3

*Advising Note: Students selecting this option are advised to take APPM 3570, 4520, 4540, and 4390 as part of their applied math course work. Other recommended courses include CSCI 3104 Algorithms and CSCI 3287 Database and Information Systems.*

Other areas of academic focus are also possible. Check with the applied mathematics office or more information.

### Double Degree with Civil Engineering

As an exceptional opportunity for talented students who are interested in analytical and computational methods related to civil engineering and general engineering science, the applied mathematics and civil engineering departments offer a streamlined dual-degree track by which a student can earn a baccalaureate degree from both programs, with a minimum of 15 extra credits instead of 30. Consult double-degree program faculty advisors in applied mathematics and civil engineering for information and admission.

### Architectural Engineering

Architectural engineering has many elements in common with civil, mechanical, and electrical engineering, but is specifically directed toward the building industry. It focuses on building systems, which include design of systems such as heating, ventilating, and air conditioning (HVAC) systems; illumination and electrical systems; structural building systems; and construction methods applied to buildings. The program is administered by the Department of Civil, Environmental, and Architectural Engineering. Students also take courses in architectural history and architectural design from the College of Architecture and Planning.

### Objective of the Architectural Engineering Program

The educational objective of the architectural engineering bachelor's degree program is to have students acquire the broad knowledge and skills necessary to successfully pursue careers and become leaders in the building engineering profession, and be able to advance the state of the industry in any of the four core disciplines:

- building electrical and lighting systems
- building heating, ventilating, and air conditioning systems
- building structural systems
- construction and construction management

### Areas of Knowledge

The areas of knowledge that define these objectives include both technical and non-technical areas.

Technical areas are:

- elementary—the fundamentals for architectural engineering, including basic science and mathematics, building design and construction processes; overview of building sys-

- tems; elementary principles and processes of architecture; and laboratory measurement and data analysis;
- intermediate—introduction to building systems and their components, with corresponding analysis of electrical, HVAC, and lighting systems as well as structural elements and components;
- proficiency—design, integration, and advanced analysis of at least two types of building systems, including design of electrical, HVAC, lighting, solar, and structural systems; as well as the codes and recommended practices that govern these building systems; and
- specialization—advanced design, coupled with industry experience via internships, for building lighting system design and specification, lighting engineering and equipment design, building HVAC systems design, building structural system design, solar system design, and construction and construction management.

Non-technical areas include:

- professional life, including methods of time and resource management, and professional ethics;
- processes and requirements of written and oral communication; and
- broad areas in the humanities and social sciences, including architectural history and language.

### Bachelor’s Degree Requirements

There is a broad core of requirements for all students. Students are also expected to choose, in consultation with faculty advisors, elective courses to add depth in one or more specialty areas. Such specialty areas include structural analysis and design, construction engineering, building energy analysis, mechanical systems, and illumination. A list of recommended electives is available to help students select a coherent academic program that enhances one of these areas.

#### Curriculum for BS (Arch E)

Required Courses	Semester Hours
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers . . . . .	4
AREN 1027 Engineering Drawing . . . . .	3
AREN 1316 Introduction to Architectural Engineering . . . . .	1
CHEM 1221 Engineering Chemistry Lab . . . . .	2
CHEN 1211 General Chemistry for Engineers. . . . .	3
Humanities or social science elective . . . . .	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
CVEN 2012 Introduction to Geomatics. . . . .	3
GEEN 1300 Intro Engineering Computing . . . . .	2
PHYS 1110 General Physics 1 . . . . .	4
Humanities or social science elective . . . . .	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
AREN 2406 Intro Building Construction . . . . .	3
AREN 2110 Thermodynamics. . . . .	3
APPM 2350 Calculus 3 for Engineers . . . . .	4
CVEN 2121 Analytical Mechanics 1 . . . . .	3
PHYS 1120 General Physics 2 . . . . .	4
<b>Spring Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra. . . . .	4
AREN 2120 Fluid Mechanics and Heat Transfere . . . . .	3

AREN 2050 Engr Systems for Buildings . . . . .	3
AREN 3540 Illumination 1 . . . . .	3
CVEN 3161 Mechanics of Materials 1 . . . . .	3

**Junior Year**

**Fall Semester**

AREN 3010 Mechanical Systems for Buildings. . . . .	3
AREN 4550 Illumination 2 . . . . .	3
CVEN 3246 Introduction to Construction . . . . .	3
CVEN 3525 Structural Analysis. . . . .	3
ECEN 3030 Electrical Circuits. . . . .	3

**Spring Semester**

AREN 4420 Cost Engineering . . . . .	3
AREN 4570 Electrical Systems . . . . .	3
CVEN 4545 Steel Design or 4555 Reinforced Concrete Design . . . . .	3
Technical elective . . . . .	3
WRTG 3030 Writing onScience and Society . . . . .	3

**Senior Year**

**Fall Semester**

ARCH 3114 History and Theories of Architecture 1 . . . . .	3
ARCH 4010 Architectural Appreciation and Design . . . . .	3
AREN 4110 HVAC Design . . . . .	3
Technical elective . . . . .	6

**Spring Semester**

ARCH 3214 History and Theories of Architecture 2 . . . . .	3
AREN 4317 Architectural Engineering Design . . . . .	5
Technical elective/Lab . . . . .	6
Humanities or social science elective . . . . .	3

**Minimum hours for degree . . . . . 128**

#### Courses Available for Specialization

Upon consultation with their advisors, students are expected to select technical elective courses applicable to their areas of interest and specialization. The areas of specialization are construction engineering and management, mechanical systems, illumination, and structural engineering.

In addition to the courses listed below, other courses not listed may be proposed by a student and approved by the advisor if they are found to be applicable.

AREN 3130 Building Energy Laboratory	
AREN 3140 Illumination Laboratory	
AREN 4315 Design of Masonry Structures	
AREN 4317 Architectural Engineering Design	
AREN 4466 Construction Planning and Scheduling	
AREN 4540 Exterior Lighting Systems	
AREN 4550 Illumination 2	
AREN 4560 Luminous Radiative Transfer	
AREN 4580 Daylighting	
AREN 4590 Computer Graphics in Lighting Engineering	
CVEN 3313 Theoretical Fluid Mechanics	
CVEN 3323 Hydraulic Engineering	
CVEN 3708 Geotechnical Engineering 1	
CVEN 3718 Geotechnical Engineering 2	
CVEN 4161 Advanced Mechanics of Materials 1	
CVEN 4525 Analysis of Framed Structures	
CVEN 4545 Steel Design	
CVEN 4555 Reinforced Concrete Design	
CVEN 4565 Timber Design	
CVEN 4087 Engineering Contracts	
CVEN 5010 HVAC System Controls 1	
CVEN 5020 Building Energy Audits	
CVEN 5030 Architectural Lighting Equipment Design	
CVEN 5040 Lighting Systems Engineering	
CVEN 5050 Advanced Solar Design	
CVEN 5060 Advanced Passive Solar Design	
CVEN 5070 Thermal Analysis of Buildings	
CVEN 5090 Building Systems Seminar	

CVEN 5110 HVAC System Design  
 CVEN 5111 Introduction to Structural Dynamics\*  
 CVEN 5161 Advanced Mechanics of Materials 1\*  
 CVEN 4511 or 5511 Introduction to Finite Element Analysis\*  
 ECEN 5767 Power Distribution Systems  
 MCEN 3022 Heat Transfer

\* For well-qualified undergraduates.

### Double Degree with Business

Students interested in pursuing a BS degree in business in addition to the BS degree in architectural engineering should be prepared to spend at least three additional semesters in school. A faculty advisor should be consulted in the student's freshman year so that social sciences and humanities courses required of business students can be taken.

Academically qualified students may want to consider working toward the master of business administration degree upon completion of the baccalaureate in engineering as an alternative to a BS in business.

### Graduate Study

Graduate credit is offered in the following courses:

CVEN 5010 HVAC System Controls  
 CVEN 5020 Building Energy Measurements and Audits  
 CVEN 5030 Architectural Lighting Equipment Design  
 CVEN 5040 Lighting Systems Engineering  
 CVEN 5050 Advanced Solar Design  
 CVEN 5060 Advanced Passive Solar Design  
 CVEN 5070 Thermal Analysis of Buildings  
 CVEN 5080 Computer Simulation of Building Energy Systems  
 CVEN 5090 Building Systems Seminar  
 CVEN 5110 HVAC Systems Design 1  
 CVEN 5111 Introduction to Structural Dynamics  
 CVEN 5161 Advanced Mechanics of Materials  
 CVEN 5206 Design Development  
 CVEN 5217 Building Reuse and Retrofit  
 CVEN 5218 Construction Accounting and Financial Management  
 CVEN 5226 Quality and Safety  
 CVEN 5236 Construction Planning and Scheduling  
 CVEN 5246 Legal Aspect Construction  
 CVEN 5256 Strategic Issues/Construction  
 CVEN 5266 Project Administration  
 CVEN 5276 Engineering Risk and Decision Analysis  
 CVEN 5286 Design Construction Operations  
 CVEN 5296 Construction Engineering 2  
 CVEN 5326 Construction Project Controls  
 CVEN 5511 Introduction to Finite Element Analysis  
 CVEN 5525 Analysis of Framed Structures  
 CVEN 5575 Advanced Topics in Steel Design  
 CVEN 5585 Advanced Topics in Reinforced Concrete Design  
 CVEN 5830 Special Topics in Energy  
 CVEN 6161 Advanced Mechanics of Materials 2  
 CVEN 6525 Finite Element Analysis of Structures  
 CVEN 6595 Earthquake Engineering  
 CVEN 7111 Dynamics of Structures  
 CVEN 7131 Theory of Elasticity  
 CVEN 7141 Plates and Shells  
 CVEN 7161 Buckling in Structures  
 CVEN 7511 Computational Mechanics of Solids and Structures  
 CVEN 7545 Structural Optimization  
 CVEN 7555 Structural Reliability

## Chemical and Biological Engineering

The Department of Chemical and Biological Engineering offers degrees at the bachelor's, master's, and doctoral levels. The department offers two distinct BS degree programs, one in chemical engineering and one in chemical and biological engineering. The Regents of the University of Colorado and the Colorado Commission on Higher Education approved the new BS program in the combined fields of chemical and biological engineering during the summer of 2006. The first graduates of the new program graduated in spring 2009 and ABET accreditation is pending.

### Bachelor of Science in Chemical Engineering

The department seeks to instill in its students an education in the principles and practices of chemical engineering that will serve a broad and dynamic range of career paths and provide a foundation for lifelong professional growth.

### Educational Objective

The primary educational objective of the undergraduate program in chemical engineering is that its alumni achieve rewarding careers in chemical engineering or related fields.

### Program Goals and Outcomes

The department strives to provide its graduating students with the knowledge, training, and opportunity prerequisite to achieving this educational objective. In doing so, the department establishes the following specific goals:

- educate students in chemical engineering fundamentals and practice
- train students in chemical process and product design
- train students in critical thinking and in the identification, formulation, and solution of open-ended engineering problems
- help students be aware of their responsibility to conduct ethical, safe, and environmentally-conscious engineering
- train students to be good communicators and function effectively as individuals and in teams
- provide students with knowledge of contemporary issues and understanding of the impact of engineering practices in global and societal contexts
- teach students the necessity for and tools for continued, lifelong learning

To fulfill these program goals, which graduates should achieve three to five years after graduation, the department has defined several program-specific outcomes that students are expected to have attained upon graduation:

- a thorough grounding in chemistry with a working knowledge of advanced chemistry, such as organic, inorganic, physical, analytical, materials chemistry, or biochemistry, selected as appropriate to the goals of the program
- material and energy balances applied to chemical processes
- thermodynamics of physical and chemical equilibria
- heat, mass, and momentum transfer
- chemical reaction engineering
- continuous and stage-wise separation operations

- process dynamics and control
- process design
- appropriate modern experimental techniques
- appropriate modern computing techniques
- safety, ethical, and environmental aspects of the topics above

Chemical engineers are responsible for producing products based on chemical processing and chemical transformations. They carry out basic research; they design, build, operate, and manage chemical processes and plants; and they supply petroleum products, renewable resources, plastics, detergents, agricultural chemicals, pharmaceuticals, biological compounds, photographic materials, microelectronic devices, and various food and other products. Today's processes must be energy efficient, nonpolluting, and profitable. Thus, students must master inorganic, organic, and physical chemistry, mathematics, statistics, computers, physics, and often biology and biochemistry. Students must learn to apply these fundamentals in the process industries. Paralleling the technical courses are studies in the humanities and the social sciences.

### Options in the Bachelor of Science in Chemical Engineering Curriculum

Curricular options have been established in fields of major importance and particular interest. To follow one of these options requires careful planning and course selection by student and advisor.

**Bioengineering Option.** Since all biological and medical systems involve complex chemical and physical processes, chemical engineering is a natural professional basis for biotechnology research. The department has a strong undergraduate program tailored to meeting the needs of students who are preparing for careers in biomedical engineering, biochemical engineering, or biotechnology. Modern biotechnology has been defined as "applied genetic engineering" and is of considerable importance due to recent advances in molecular biology and genetic engineering. The successful industrial application of these advances will, in large part, depend on new chemical engineering initiatives in the development of high-rate bioreactors, efficient separation, and purification techniques for bioproducts, and computer-interfaced instrumentation for optimal bioprocess control.

The courses available for this option are Pharmaceutical Biotechnology, Bioprocess Engineering, and Biochemical Separations. In addition, bioengineering option students are required to complete two semesters of general biology and one semester of biochemistry.

The department also offers graduate bioengineering technology research programs at both the MS and PhD levels. These programs are oriented toward specialization in various aspects of biochemical engineering, biomedical engineering, biotechnology, and sensory physiology.

**Environmental Option.** Chemical engineers can make major contributions in the fields of pollution prevention and control, resource utilization, and environmental improvement. The environmental engineering option is designed to emphasize biological and environmental sciences, the effects of chemicals on the environment, and chemical engineering applications in environmental problems.

The courses taken by students following this option include electives in environmental science and engineering. A capstone course in environmental engineering processes or environmental separations is taken in the senior year.

**Computer Option.** Applications of computers in chemical engineering are widespread, and the chemical engineer who has solid preparation in computer science and engineering is in demand. Areas include computer architecture and interfacing; machine, assembly, and high-level language programming; and online real-time computing. Students in this option complete the core of the electrical and computer engineering degree program in the Department of Electrical, Computer, and Energy Engineering.

**Materials Option.** The need to develop new materials for a rapidly broadening spectrum of applications is one of the major technological challenges confronting applied science. Chemical engineers have the required background in chemistry and transport theory to contribute significantly in this area. This option focuses on polymeric and ceramic materials by complementing the chemical engineering curriculum with elective courses stressing the interrelationship between materials fabrication, structure, properties, and performance.

**Microelectronics Option.** The manufacture of semiconductor microelectronic circuits or "chips" involves many chemical steps. In recent years, more and more chemical engineers are finding employment in the expanding microelectronics industry. Completion of this option, which includes courses in solid state and semiconductor physics and microstructure fabrication, provides specialization to help launch a successful career in microelectronics.

**Premedicine Curriculum Track.** This track is offered for students preparing for medical school. Since chemical engineering already requires most of the premed courses, it is a logical choice for students who desire an engineering degree and the opportunity to pursue a medical profession.

### Curriculum for BS in Chemical Engineering (ChE)

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers . . . . .	4
CHEM 1211 General Chemistry for Engineers. . . . .	3
CHEM 1221 General Chemistry Laboratory for Engineers. . . . .	2
GEEN 1300 Introduction to Engineering Computing . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
CHEM 1300 Introduction to Chemical Engineering (Note 1). . . . .	1
CHEM 2810 Biology for Engineers . . . . .	3
PHYS 1110 General Physics 1 . . . . .	4
Humanities or social science elective (Note 2) . . . . .	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2350 Calculus 3 for Engineers . . . . .	4
CHEM 3311 Organic Chemistry 1 . . . . .	4
CHEM 3321 Laboratory in Organic Chemistry. . . . .	1
CHEM 2120 Material and Energy Balances . . . . .	3
PHYS 1120 General Physics 2 . . . . .	4
PHYS 1140 Experimental Physics . . . . .	1
<b>Spring Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra. . . . .	4
CHEM 3331 Organic Chemistry 2. . . . .	4
CHEM 3341 Laboratory in Organic Chemistry 2. . . . .	1
CHEM 4521 Physical Chemistry for Engineers (Notes 1 and 4). . . . .	3
CHEM 3200 Chemical Engineering Fluid Mechanics (Note 1). . . . .	3
Humanities or social science elective (Note 2) . . . . .	3
<b>Junior Year</b>	
<b>Fall Semester</b>	
CHEM 3010 Applied Data Analysis (Note 1). . . . .	3

CHEN 3210 Chemical Engineering Heat Transfer (Note 1) . . . . .	3
CHEN 3320 Chemical Engineering Thermodynamics (Note 1) . . . . .	3
WRTG 3030 Writing on Science and Society . . . . .	3
Elective (Note 3) . . . . .	4
<b>Spring Semester</b>	
CHEN 3130 Chemical Engineering Laboratory 1 (Note 1) . . . . .	2
CHEN 3220 Chemical Engineering Separations and Mass Transfer (Note 1) . . . . .	3
CHEN 4330 Chemical Engineering Reaction Kinetics (Note 1) . . . . .	3
Chemistry Elective (Note 5) . . . . .	3
Elective (Note 3) . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3

**Senior Year****Fall Semester**

CHEN 4090 Undergraduate Seminar (Note 1) . . . . .	1
CHEN 4130 Chemical Engineering Laboratory 2 (Note 1) . . . . .	2
CHEN 4520 Chemical Process Synthesis (Note 1) . . . . .	3
Elective (Note 3) . . . . .	3
Elective (Note 3) . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3

**Spring Semester**

CHEN 4440 Chemical Engineering Materials (Notes 1 and 6) . . . . .	3
CHEN 4530 Chemical Engineering Design Project (Note 1) . . . . .	2
CHEN 4570 Instrumentation and Process Control (Note 1) . . . . .	4
Elective (Note 3) . . . . .	3
Elective (Note 3) . . . . .	3

**Minimum total hours for degree . . . . . 128**

**Curriculum Notes**

1. Course offered only in semester indicated.
2. Courses must meet humanities and social science requirements. Students should consult their advisor and the current ChE Help Guide.
3. Electives must meet specific requirements. See the current ChE Help Guide.
4. Students may take CHEM 4511 if during the fall semester.
5. Students should consult the current ChE Help Guide about chemistry electives.
6. Alternate is CHEN 4460 Polymer Engineering.

## Bachelor of Science in Chemical and Biological Engineering

The Department of Chemical and Biological Engineering at the University of Colorado seeks to instill in its students an education in the principles and practice of chemical and biological engineering that will serve a broad and dynamic range of career paths and provide a foundation for lifelong professional growth.

### Educational Objective

The primary educational objective of the undergraduate program in chemical and biological engineering is that its alumni achieve rewarding careers in chemical and biological engineering or related fields.

### Program Goals and Objectives

The department strives to provide its graduating students with the knowledge, training, and opportunity prerequisite to achieving this educational objective. In doing so, the department establishes the following specific goals:

- educate students in chemical and biological engineering fundamentals and practice
- educate students in the application of biological science to chemical engineering fundamentals and practice
- train students in chemical process and product design
- train students in critical thinking and in the identification, formulation, and solution of open-ended engineering problems
- help students be aware of their responsibility to conduct ethical, safe, and environmentally-conscious engineering

- train students to be good communicators and function effectively as individuals and in teams
- provide student with knowledge of contemporary issues and understanding of the impact of engineering practices in global and societal contexts
- teach students the necessity for and tools for continued, life-long learning

To fulfill these program goals, which graduates should achieve three to five years after graduation, the department has defined several program-specific outcomes that students should have attained upon graduation. This set of outcomes, as defined by our program, is that graduating students demonstrate knowledge and ability according to:

- a thorough grounding in mathematical skills required to carry out engineering computations
- a thorough grounding in chemistry and biochemistry with a working knowledge of advanced chemistry, such organic, inorganic, physical, analytical, or materials chemistry, selected as appropriate to the goals of the program
- material and energy balances applied to chemical processes
- thermodynamics of physical and chemical equilibria
- heat, mass, and momentum transfer
- chemical reaction engineering
- continuous and stage-wise separation operations
- biological systems and biological kinetics
- biochemical separations
- process dynamics and control
- process design
- appropriate modern experimental techniques
- appropriate modern computing techniques
- safety, ethical, and environmental aspects of the topics above

The chemical engineering field has traditionally had a natural affinity and synergy with the fields of molecular and cellular biology including biotechnology, pharmaceutical sciences, tissue engineering, and medicine. These synergies have led the Department of Chemical and Biological Engineering to establish this new degree track in the combined fields of chemical and biological engineering. Graduates of this new program will be trained in the traditional field of chemical engineering with foci on chemical transformations and separations; however, they will have further knowledge and ability in applying these skills to the emerging areas in biological engineering such as biotechnology, metabolic engineering, and pharmaceutical sciences. In contrast to the traditional BS in chemical engineering, students must master additional skills in biology, medicine, bioseparations, biological laboratory skills, and biological transformations.

**Premedicine Curriculum Track.** This track is offered for students preparing for medical school. Since chemical and biological engineering already requires most of the premed courses, it is a logical choice for students who desire an engineering degree and the opportunity to pursue a medical profession.

### Curriculum for BS in Chemical and Biological Engineering (ChBE)

<i>Required Courses</i>	<i>Semester Hours</i>
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**Freshman Year****Fall Semester**

APPM 1350 Calculus 1 for Engineers . . . . .	4
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CHEM 1221 General Chemistry Laboratory for Engineers. . . . .	2
CHEN 1211 General Chemistry for Engineers. . . . .	3
GEEN 1300 Introduction to Engineering Computing . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
CHEN 1300 Introduction to Chemical Engineering (Note 1). . . . .	1
CHEN 2810 Biology for Engineers . . . . .	3
PHYS 1110 General Physics 1 . . . . .	4
Humanities or social science elective (Note 2) . . . . .	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2350 Calculus 3 for Engineers . . . . .	4
CHEM 3311 Organic Chemistry 1. . . . .	4
CHEM 3321 Laboratory in Organic Chemistry. . . . .	1
CHEN 2120 Material and Energy Balances . . . . .	3
PHYS 1120 General Physics 2 . . . . .	4
PHYS 1140 Experimental Physics . . . . .	1
<b>Spring Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra. . . . .	4
CHEM 3331 Organic Chemistry 2. . . . .	4
CHEM 3341 Laboratory in Organic Chemistry 2. . . . .	1
CHEM 4521 Physical Chemistry for Engineers (Notes 1 and 4). . . . .	3
CHEN 3200 Chemical Engineering Fluid Mechanics (Note 1). . . . .	3
Humanities or social science elective (Note 2) . . . . .	3
<b>Junior Year</b>	
<b>Fall Semester</b>	
CHEN 3010 Applied Data Analysis (Note 1) . . . . .	3
CHEN 3210 Chemical Engineering Heat Transfer (Note 1) . . . . .	3
CHEN 3320 Chemical Engineering Thermodynamics (Note 1) . . . . .	3
WRTG 3030 Writing on Science and Society. . . . .	3
Elective (Note 3) . . . . .	4
<b>Spring Semester</b>	
CHEN 3130 Chemical Engineering Laboratory 1 (Note 1) . . . . .	2
CHEN 4611 Survey of Biochemistry (Note 5)3	
CHEN 4830 Biokinetics (Note 1)3	
CHEN 3220 Chemical Engineering Separations and Mass Transfer (Note 1). . . . .	3
CHEN 4805 Biomaterials (Note 1) . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3
<b>Senior Year</b>	
<b>Fall Semester</b>	
CHEN 4090 Undergraduate Seminar (Note 1). . . . .	1
CHEN 4520 Chemical Process Synthesis (Note 1) . . . . .	3
CHEN 4810 Chemical and Biological Engineering Laboratory 2 (Note 1) . . . . .	2
CHEN 4820 Biochemical Separations (Note 1) . . . . .	3
Elective (Note 3) . . . . .	3
Elective (Note 3) . . . . .	3
<b>Spring Semester</b>	
CHEN 4530 Chemical Engineering Design Project (Note 1). . . . .	2
CHEN 4570 Instrumentation and Process Control (Note 1) . . . . .	4
Elective (Note 3) . . . . .	3
Focus Tech Elective (Note 6) . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3
<b>Minimum total hours for degree.</b> . . . .	<b>128</b>
<b>Curriculum Notes</b>	
1. Course offered only in semester indicated.	
2. Courses must meet humanities and social science requirements. Students should consult their advisor and the current ChE Help Guide.	
3. Electives must meet specific requirements. See the current ChE Help Guide.	
4. Students may take CHEM 4511 if during the fall semester.	
5. Alternate is CHEM 4711.	
6. One of the following courses must be taken as the focus technical elective: CHEN 4801 Pharmaceutical Biotechnology, CHEN 4838 Tissue Engineering/Biomedical Devices, or CHEN 4838 Metabolic Engineering. These courses will be taught in 899/alternating years and should be taken in the junior or senior year as available.	

## Other Opportunities in the Department of Chemical and Biological Engineering.

At the BS, MS, and PhD levels, there are opportunities to specialize via electives, independent study, and research. The BS in chemical engineering also offers optional variations to the core curriculum that allow students to specialize in environmental, computer, microelectronic, and materials aspects of chemical engineering. If a student has an interest that is not included in the following information, special arrangements can usually be made.

Students may carry out part of their studies in another country (see the Office of International Education section in this catalog), and are encouraged to consider this opportunity, given the international nature of most large chemical and engineering corporations and international cooperation in scientific and engineering research. Many faculty members have significant international experience.

**Cooperative Education and Internships.** The Department of Chemical and Biological Engineering offers a formal Co-op Program, where students obtain a BS in chemical engineering or chemical and biological engineering and significant industrial experience in five years. A Biotechnology Internships program is also offered for summer internships with local companies.

**Senior Thesis.** The department offers this program for undergraduates with a strong interest in research. The student carries out a year-long project under the direction of a faculty member in lieu of taking CHEN 4130 Chemical Engineering Laboratory 2 (for ChE students) or CHEN 4810 Biological Engineering Lab (for ChBE students). Students must apply at the end of their junior year.

## Graduate Degree Programs

Major areas of current research interest in the chemical engineering department are applied mathematics and computers, biomedical and tissue engineering, biotechnology, ceramics processing, colloid science, environmental engineering, heterogeneous catalysis and kinetics, fluid dynamics, low gravity science, mass transfer, materials engineering, membrane and polymer science, particle technology, process control and optimization, separations, supercritical fluids, surface science and interfacial phenomena, transport in porous media, and thermodynamics.

### Master of Science Degree Requirements

**Admission.** General criteria for regular admission to the master's program include a bachelor's degree with a 3.000 or better overall GPA from a college or university of recognized standing, equivalent to the degree given at this university (or college work equivalent to that required for such a degree, at least 96 semester hours of which must be acceptable toward a degree at this university); promise of ability to pursue advanced study and research, as judged by previous scholastic record or otherwise; and adequate preparation to begin graduate study in the chosen field.

A candidate for the master of science degree in chemical engineering must fulfill the following departmental requirements:

1. Thirty semester hours of graduate work, including a satisfactory thesis. Maximum credit of 6 semester hours is allowed for the completion of the master's thesis. A nonthesis master's degree is available and requires completion of 30 semester hours of course work.
2. A final examination as required by the Graduate School on the thesis.

It is expected that a qualified student can complete the master's degree in less than two calendar years. A graduate student

with a bachelor's degree in a field related to chemical engineering can obtain the master's degree in chemical engineering but may be required to make up deficiencies in background. Programs are arranged on an individual basis.

The following courses comprise the core for the MS degree:

CHEN 5210 Transport Phenomena (required)

And two of

CHEN 5370 Intermediate Chemical Engineering Thermodynamics

CHEN 5390 Chemical Reactor Engineering

CHEN 5740 Analytical Methods in Chemical Engineering

The course CHEN 5128 Applied Statistics in Research and Development may be taken as an alternate to CHEN 5740.

A degree plan must be prepared at the beginning of the academic program in consultation with an advisory committee. The student is urged to maintain close contact with this advisory committee during the entire course of study.

The MS thesis committee must consist of three members, including at least two graduate faculty members from the Department of Chemical and Biological Engineering.

### *Master of Engineering Degree Requirements*

**Admission.** (The standards of admission to the MS program also apply to ME degree applicants.) A 3.000 overall undergraduate GPA is required for regular admission.

**ME Degree Advisor.** All ME candidates should see the chemical engineering master of science degree advisor for counseling.

**Requirements for Graduation.** Students orally defend their written reports as specified in the ME degree description, and a comprehensive examination is administered by the student's advisory committee on the report and course work.

### *Doctor of Philosophy Admission Requirements*

1. The applicant must have achieved academic competence equivalent to a master of science degree from an accredited college or university, with a GPA substantially above the minimum normally required for the degree.
2. The applicant must show the ability to perform independent research.
3. The applicant must indicate a field of specialization and obtain an advisor in the chemical engineering graduate faculty.
4. The applicant must pass the PhD preliminary examination administered by the Department of Chemical and Biological Engineering.

A candidate for the doctor of philosophy degree must meet the requirements as described under requirements for advanced degrees in the Graduate School chapter. A minimum of 30 semester hours of courses numbered 5000 or above is required for the degree, including those applied toward an MS degree. These must include all five core courses listed previously.

All PhD students in chemical engineering must satisfy a communication skills requirement. This includes performing an advanced teaching assistantship and demonstrating satisfactory communication skills on the PhD comprehensive examination. Students whose primary language is English may choose to demonstrate foreign language proficiency instead of being judged on their communications skills on the comprehensive exam.

The PhD dissertation committee must consist of five members, including at least three from the Department of Chemical and Biological Engineering and at least one from within CU-Boulder, but outside the department. A graduate faculty member of the department must serve as chair of the committee.

## Research Facilities

Chemical and biological engineering research facilities are extensive and modern. Nearly all research equipment is interfaced to computers for automated data collection, monitoring, and control. A full description of chemical engineering research facilities can be found in the Graduate School section.

## Civil Engineering

The curricula in civil engineering within the Department of Civil, Environmental, and Architectural Engineering have been designed to qualify students for entry-level positions in professional practice in the areas of civil and environmental engineering. These broad area designations may be separated into the subdisciplines of construction engineering and management; environmental engineering; geotechnical engineering and geomechanics; mechanical systems; structural engineering and structural mechanics; and water resource engineering and management. Through the regular curriculum, students will be ready to enter professional practice in the foregoing areas and be equipped to progress to higher levels in many directions. An Engineering Science track is also available for undergraduates who want additional preparation for graduate study and careers in research and development.

The overall objectives of the bachelor of science program are to:

- enable students to apply basic knowledge in mathematics, basic science, and engineering fundamentals to solving problems and making effective designs in areas encompassing a breadth of civil engineering professional practice in contemporary society;
- allow students sufficient specialization to prepare them for professional careers and/or graduate study in subdisciplines of civil engineering: construction, environmental, geotechnical, structural, and water resources engineering;
- enable students to enhance technical contributions to the public infrastructure with understanding of nontechnical issues, especially those that bear on civil engineering projects such as cost, public safety, and health;
- expose students to the unique responsibility of civil engineers to uphold ethical relationships with both their clients and with the public at large;
- teach students how to extend their knowledge and skills in order to meet new technical challenges and continuously innovate in their chosen professional careers; and
- give students a broad education in humanities and social sciences and encourage them to participate fully in a democratic society.

Before their graduation, students in civil and environmental engineering will take a capstone design course in addition to training in structural and foundation design, civil engineering systems, construction, engineering geology, engineering materials, geotechnical engineering, soil mechanics, water quality, environmental engineering, fluid mechanics, computer-aided and manual engineering drawing, mechanics and dynamics, computer modeling, professional practice and ethics seminars, structural analysis and design, surveying, and transportation systems via required and elective courses.

### Bachelor's Degree Requirements

The central curriculum requires students to obtain a background in the humanities, a broad knowledge of the basic engineering



sciences of chemistry, mathematics (including differential equations), physics, mechanics (including fluid mechanics and soil mechanics), electricity, and thermodynamics. Social-humanistic hours may be devoted to the social sciences, the humanities, or to approved communication courses, with not more than 12 hours from any one of the three areas.

Advanced technical courses are selected in the senior year. Random selection is not allowed as the objective is to prepare a graduate to enter the engineering profession with a firm ground-work in fundamental engineering science as well as adequate technical fluency in selected areas. Students should consult with their advisors on their choices.

### Curriculum for BS (CE)

Required Courses	Semester Hours
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers . . . . .	4
CHEM 1221 General Chemistry Laboratory for Engineers. . . . .	2
CHEN 1211 General Chemistry for Engineers. . . . .	3
CVEN 1317 Introduction to Civil and Environmental Engineering. . . . .	1
GEEN 1400 Basic Engineering Projects . . . . .	3
Humanities or social science elective . . . . .	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
AREN 1027 Engineering Drawing . . . . .	3
CVEN 2012 Introduction to Geomatics. . . . .	3
PHYS 1110 General Physics 1 . . . . .	4
Humanities or social science elective . . . . .	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2350 Calculus 3 for Engineers . . . . .	4
AREN 2110 Thermodynamics. . . . .	3
CVEN 2121 Analytical Mechanics 1 . . . . .	3
PHYS 1120 General Physics 2 . . . . .	4
PHYS 1140 Experimental Physics . . . . .	1
Humanities or social science elective . . . . .	3
<b>Spring Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra. . . . .	4
GEEN 1300 Introduction to Engineering Computing . . . . .	3
CVEN 3161 Mechanics of Materials 1 . . . . .	3
CVEN 3313 Theoretical Fluid Mechanics . . . . .	3
CVEN 3698 Engineering Geology. . . . .	3
<b>Junior Year</b>	
<b>Fall Semester</b>	
CVEN 3246 Introduction to Construction . . . . .	3
CVEN 3323 Hydraulic Engineering . . . . .	3
CVEN 3414 Fundamentals of Environmental Engineering . . . . .	3
CVEN 3525 Structural Analysis. . . . .	3
CVEN 3708 Geotechnical Engineering 1. . . . .	3
<b>Spring Semester</b>	
CVEN 3111 Analytical Methods II . . . . .	3
CVEN 3227 Probability, Statistics, and Decision for Engineers. . . . .	3
CVEN Proficiency I. . . . .	3
CVEN Proficiency II . . . . .	3
WRTG 3030 Writing on Science and Society. . . . .	3
<b>Senior Year</b>	
<b>Fall Semester</b>	
CVEN Proficiency III. . . . .	3
CVEN Proficiency IV. . . . .	3
CVEN 3602 Transportation Engineering . . . . .	3
Concentration I. . . . .	3
Humanities or social science elective (3000-level or above). . . . .	3
<b>Spring Semester</b>	
CVEN 4830 Senior Design Project . . . . .	4
Concentration II . . . . .	3

Technical electives . . . . .	6
Humanities or social science elective (3000- level or above) . . . . .	3

**Minimum hours for degree . . . . . 128**

#### Curriculum Notes

1. Not more than 6 hours of technical electives may be taken outside the department, and then only for defensible reasons.
2. The capstone course requirement is satisfied by CVEN 4830 Civil and Environmental Engineering Design Project, to be taken in the year of graduation.

### Double Degree with Applied Mathematics

As an exceptional opportunity for talented students who are interested in analytical and computational methods related to civil engineering and general engineering science, the civil engineering and applied mathematics departments offer a streamlined dual-degree track by which a student can earn a baccalaureate degree from both programs, with a minimum of 15 extra credits instead of 30. Consult double degree program faculty advisors in civil engineering and applied mathematics for information and admission.

### Double Degree with Business

Students interested in pursuing a BS degree in business in addition to the BS degree in civil engineering should be prepared to spend at least three additional semesters in school. A faculty advisor should be consulted in the student's freshman year so that social sciences and humanities courses required of business students can be taken.

Academically qualified students may want to consider working toward the master of business administration degree upon completion of the baccalaureate in engineering as an alternative to a BS in business.

### Graduate Degree Programs

A pamphlet on the requirements for graduate study in civil engineering is available from the departmental office. The Graduate Record Examination, consisting of the aptitude tests and advanced test in engineering, is used in the evaluation of candidates and competition for university and other fellowships. Therefore, students who wish to be considered for fellowships are advised to take this examination prior to their arrival on campus. There is no other qualifying examination required by the department for the master of science degree.

The department offers the master of science, master of engineering, and doctor of philosophy degrees with study emphasis in several major areas: building energy systems, construction engineering and management, environmental engineering, life cycle engineering, geotechnical engineering and geomechanics, environmental fluid mechanics, geoenvironmental engineering, structural engineering and structural mechanics, water resources engineering, and general engineering science. A major in transportation and planning is possible through the Denver campus.

### Master of Science Degree

Requirements for this master's degree can be fulfilled in two ways. Under Plan I, the candidate presents 30 semester hours of course work including thesis, and under Plan II, 30 credit hours of course work are required.

### Master of Engineering Degree

Requirements for this professionally oriented degree are available from the dean's office.

### Doctor of Philosophy Degree

This degree requires a minimum of 30 semester hours of graduate-level work (5000 level or above), the last 15 of which must be taken at this university. The doctoral dissertation likewise requires 30 semester hours. The applicant for this degree normally has completed a master's degree in civil engineering or a closely related field and must demonstrate the capability for both rigorous academic accomplishments and independent research.

### Research Interests and Facilities

The department has a wide variety of research facilities, including a 15g-ton centrifuge for geotechnical and structural model studies and a large 440g-ton geotechnical centrifuge for use in model testing. Also available is an instructional computing facility, the Bechtel Laboratory, and the M.Y. Leung Computational Laboratory for Soils and Structures, both equipped with Windows and Linux high-performance workstations. In addition, extensive structural engineering, engineering mechanics, and geotechnical capabilities exist such as a one-million-pound universal testing machine and several cubical cells for multi-axial testing of materials. A 40 ft. by 80 ft. structural strong floor with associated equipment permits the testing of a wide variety of structural configurations under controlled, both static and dynamic loading. The hydraulics and water resources research laboratories include excellent facilities in water quality and environmental engineering. A unique workstation laboratory for advanced decision support systems is available. Programs in construction management and building energy are well supported. A state-of-the-art HVAC laboratory is capable of testing full-scale, commercial building HVAC systems and their controls using a one-of-a-kind data acquisition and experimental control system.

The Center for Advanced Decision Support for Water and Environmental Systems (CADSWES) is an interdisciplinary center of excellence, housed within the Department of Civil, Environmental, and Architectural Engineering. CADSWES focuses on applying advanced computing techniques to provide decision makers with decision support systems (DSSs) to help them more effectively manage water and environmental systems.

Current research covers such topics as water and wastewater treatment, surface and subsurface contaminant transport, decision support systems, hydraulic research, land treatment, rapid infiltration, and activated sludge processes. Cost prediction in construction, construction management, energy conservation in buildings, solar applications, and lighting systems are included. Advances in soil mechanics, rock mechanics, soil dynamics and geotechnical earthquake engineering, foundation engineering, computational geomechanics, centrifugal modeling, geosynthetics, and glacier flows have been produced. Research in structures includes stability, damage and fracture, material microstructures, durability, finite element modeling, reinforced concrete, earthquake responses, reinforced masonry structures, prestressed concrete, and dynamic control.

### Computer Science

Computer science is an exciting and challenging field that has impact on many parts of our lives. Computer scientists craft the technologies that keep cell phones and iPods working. They develop the large-scale software that powers business and industry, and advance the computational techniques and write the software that supports scientists in their study of the world around us. Many new computer applications remain to be discovered.

Indeed, computing will be at the heart of future revolutions in business, science, and society. Students who study computer science now will be at the forefront of those important advances.

Computer science is concerned with how computers are constructed, how they store and process data, how they are used in problem-solving, and how the quality of those solutions is assessed. It is about the science of creating software for a variety of users. It is about understanding how that software interacts with the hardware on which it is run. Computer science goes well beyond the machine to the study of how people interact with the technologies around them. Applications of computer science reach far and wide.

Computer science graduates from the University of Colorado at Boulder are engaged in a wide variety of jobs with many different companies in locations all over the world. They produce the software and systems that touch lives every day in fields ranging from communications to finance to publishing. They are, of course, software developers, but also have become teachers, writers, doctors, lawyers, scientists, military leaders, and entrepreneurs. They work at some of the largest, most influential companies in the world, at research institutions, non-profits, and at the smallest start-ups of every type imaginable. And many lead highly successful companies that they themselves have founded.

### Program Objectives

Within three to five years after graduation, computer science graduates:

- are prepared to be valued individual contributors in a software-oriented organization, to be programmers and designers in an entrepreneurial pursuit, to lead small projects and generally begin preparation for a management career, or to succeed in rigorous postgraduate programs.
- are able to focus their careers on pure computer science technology or to bring computer science expertise to a companion discipline.
- are prepared, where appropriate, to specialize in a broad spectrum of computer science sub-disciplines, ranging across formal computer science (e.g., computational science, bioinformatics, and theory), cognitive science (e.g., human/machine learning, human-computer interaction, collaborative work, and human language technologies), and core computing (e.g., systems, networks and software engineering).

### Program Outcomes

Students completing the undergraduate degree in computer science will possess:

- an ability to apply knowledge of computing and mathematics appropriate to the discipline.
- an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
- an ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
- an understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.

- an ability to communicate effectively about computing topics with a range of audiences.
- an ability to analyze impacts of computing on individuals, organizations, and society.
- a recognition of the need for and ability to engage in continuing professional development.
- an ability to use current techniques, skills, and tools necessary for computing practice.
- an ability to apply mathematical foundations, algorithm principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- an ability to apply design and development principles in the construction of software systems of varying complexity.

### Bachelor's Degree Requirements

Requirements for the BS degree in computer science include course work in computer science, mathematics, natural science, and the humanities and social sciences, as well as free elective course work. The degree provides considerable freedom in the selection of specific courses to fulfill these requirements, allowing students to tailor the degree to their individual needs and interests.

The department's goal is to prepare students for an intriguing and satisfying career in computer science. The huge number of technical jobs and the shortage of people to fill them mean that opportunities are great for today's computer science graduates.

Tracks in the curriculum are geared toward a variety of specializations. These tracks reflect the fact that computer science is transforming such disciplines as medicine, the sciences, and social science. The tracks also illustrate various software and hardware themes within the field of computer science. In addition to the more general degree requirements for all computer science majors, majors need to complete the course requirements for one of the following tracks:

#### General Computing

The general computing track provides a broad-based background drawing from the entire spectrum of computing. Depending on the courses selected, students can be exposed to the design and architecture of computers, the development of software, and the theory and techniques used in designing efficient computer programs. Students can also learn about application of computers to problems in science, in human-computer interaction, and in data management. This track prepares students for careers in many different areas of computer science.

#### Computational Biology and Health Informatics

Computer science is rapidly becoming critical to many areas of biology, medicine, and health. This track's flexible requirements reflect the diverse fields of computer science that are applied to problems in biology or health, including human-computer interfaces, database design and data mining, algorithms, machine learning, and numerical computation. Students graduating from this track will be ready to work in teams to develop the software and systems for a variety of biomedical applications.

#### Computational Science and Engineering

Problems considered by computational scientists include climate and weather prediction, spacecraft design, video game construction, and the discovery of new medicines and treatments among many others. This track emphasizes courses in numerical com-

putation, high-performance scientific computing, and supporting areas of science and computer science. It provides exposure to leading-edge computing systems.

#### Digital and Social Systems

Students in this track will learn how to design, build, and evaluate socio-technical systems of the future that will tie together technology with communication, collaboration, and other social processes to address the challenges and opportunities of our world. The learning opportunities in this track draw on and integrate research in human computer interaction, design of interactive systems, computer supported cooperative work, computer supported collaborative learning, educational technology, tools that support creativity, user-developed knowledge collections, and gaming.

#### Networked Devices and Systems

It is the role of networked systems professionals to select, design, deploy, integrate, evaluate, and administer network and communication infrastructures. This track emphasizes courses in deployment of networks with specific design and protocol requirements, applying networking to deploy services in multimedia, information storage and distribution, security, and services on the Internet such as the Web and e-mail, and operating systems analysis and management.

#### Software Engineering

Software permeates the very fabric of modern society. This track emphasizes courses in core software engineering concepts, methods, and tools, the understanding of user requirements and user interface design, the ability to design programming languages and software tools that support software development, and working in teams to achieve complex objectives. The position of software engineer was recently ranked as the "best job" in America.

#### Systems

Computers benefit almost every part of our lives—from entertainment to cars to phones to medical devices. Computer systems engineers work with hardware and software to help application developers make these devices a reality. This track emphasizes courses in direct control of hardware through low-level software, the design and implementation of operating systems and programming languages, networking and performance analysis, as well as embedded system design.

Additional information about the department's programs is available at [www.cs.colorado.edu](http://www.cs.colorado.edu) or by contacting the department at 303-492-7514.

### Curriculum for BS (CS)

Required Courses	Credit Hours
<b>First Year</b>	
<b>Fall Semester</b>	
CSCI 1000 Computer Science as a Field of Work and Study . . . . .	1
CSCI 1300 Computer Science 1: Programming . . . . .	4
APPM 1350 Calculus 1 for Engineers . . . . .	4
Natural science . . . . .	4
Humanities and social sciences . . . . .	3
Semester credit hours. . . . .	16
<b>Spring Semester</b>	
CSCI 2270 Computer Science 2: Data Structures . . . . .	4
APPM 1360 Calculus 2 for Engineers . . . . .	4
Natural science . . . . .	5
Humanities and social sciences . . . . .	3
Semester credit hours. . . . .	16

**Second Year****Fall Semester**

CSCI 2400 Computer Systems . . . . .	4
CSCI 2824 Discrete Structures . . . . .	3
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	3
CSCII — Track Foundation/Core or Computer Science Elective . . . . .	3
Free Elective . . . . .	3
Semester credit hours . . . . .	16

**Spring Semester**

CSCI 3104 Algorithms . . . . .	4
CSCI 2830 Linear Algebra with Computer Science Applications . . . . .	3
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	4
Humanities and social sciences . . . . .	3
Semester credit hours . . . . .	14

**Third Year****Fall Semester**

CSCI 3155 Principles of Programming Languages . . . . .	4
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	4
Probability or statistics . . . . .	3
Humanities and social sciences . . . . .	3
Free elective . . . . .	3
Semester credit hours . . . . .	17

**Spring Semester**

CSCI — Track Foundation/Core or Computer Science Elective . . . . .	3
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	3
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	3
WRTG 3030 Writing on Science and Society . . . . .	3
Natural science . . . . .	4
Semester credit hours . . . . .	16

**Fourth Year****Fall Semester**

CSCI — Track Capstone . . . . .	4
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	3
Natural science . . . . .	4
Humanities and social sciences . . . . .	3
Free elective . . . . .	3
Semester credit hours . . . . .	17

**Spring Semester**

CSCI — Track Capstone . . . . .	4
CSCI — Track Foundation/Core or Computer Science Elective . . . . .	3
Upper-division humanities and social sciences . . . . .	3
Humanities and social sciences . . . . .	3
Free elective . . . . .	3
Semester credit hours . . . . .	16
<b>Total credit hours . . . . .</b>	<b>128</b>

**Minor Program**

The department offers a minor in computer science that is available to undergraduates on the Boulder campus. The minor offers a basic introduction to the field of computer science.

**Graduate Degree Programs****General Admission Requirements**

Graduate students should consider a major in computer science if they are primarily interested in the general aspects of computational processes, both theoretical and practical, e.g., methods by which algorithms are implemented on a computer, techniques for using computers accurately and efficiently, design of computer systems, and languages and interfaces. A student who is primarily interested in the results of a computer process and its relation to a particular area of application should major in another field and consider a minor in computer science.

Applicants are considered for graduate study in computer science if they hold at least a bachelor's degree or its equivalent from an institution comparable to the University of Colorado.

They should have considerable programming experience, sufficient mathematical maturity to understand pure mathematics courses at the upper-division level, and a number of academic computer science courses.

Applicants should satisfy the following requirements for mathematics courses: at least three semesters of mathematics at the level of sophistication of calculus or above, courses such as: differential equations, linear algebra, probability, statistics, and abstract algebra. These courses need not be in a mathematics department; however, they should require mathematical maturity expected of a junior or senior mathematics undergraduate.

In computer science, applicants should have the equivalent of the following University of Colorado courses: CSCI 1300 Computer Science 1: Programming; ECEN 2120 Computers as Components; one course out of CSCI 3155 Programming Languages or CSCI 3753 Operating Systems; CSCI 2270 Computer Science 2: Data Structures; and either CSCI 3104 Algorithms or CSCI 3434 Theory of Computation; and one other upper-division computer science course. Upper-division courses in areas such as artificial intelligence, databases, numerical computation, operating systems, parallel processing, software engineering, and others can be substituted for courses on the above list. However, courses on the list are prerequisites to many of the graduate-level offerings and admitted students lacking their equivalent are usually required to make them up, without graduate credit. Students who lack this computer science background but who have exceptionally strong credentials in another field should contact the department for individual consideration.

Applicants should have a GPA of at least 3.000 (on a scale of 4.000). Applicants having the listed qualifications are, if accepted, classified as regular degree students. Applicants with an average below 3.000 and above 2.750 and/or lacking certain of the prerequisites listed above are sometimes considered for admission as provisional students.

These requirements apply to both the master's and PhD programs. Applicants should be aware that admission to both programs is very competitive, and meeting the requirements does not ensure admission. Admission to the PhD program is especially competitive, and successful applicants, in general, have records considerably stronger in breadth and quality than these minimum standards suggest.

PhD applicants are required to submit scores from the aptitude portion of the Graduate Record Examination (GRE). GRE scores are optional for master's applicants but are required if the undergraduate GPA is less than 3.000 (but above a 2.750). These scores are encouraged if previous study was at an institution lacking a strong national reputation.

Financial aid is available to PhD students in the form of teaching and research assistantships and fellowships. Aid is sometimes available for master's students as teaching assistants or graders, but positions are assigned only at the beginning of a semester.

Applications from domestic U.S. students for the master's program should be received by February 28 for fall admission and by October 15 for spring admission. For international students, applications for the MS and PhD programs should be received by December 1 for fall admission and September 1 for spring admission.

Applications from domestic U.S. students for the PhD program should be received by January 2 for fall admission and by October 1 for spring admission. For international students, applications for the PhD program should be received by December 1 for fall admission and by September 1 for spring admission.

### Master's Degree

Admission requirements for this program are given above under General Admission Requirements. Plan I (thesis) or Plan II (no thesis) may be followed. In either plan, students must complete 30 credit hours of course or thesis work. The requirements for Plan I are as stated under the general requirements of the Graduate School section in this catalog. Students in Plan I receive 6 credit hours for thesis work and are examined orally on their thesis. Students in Plan II must pass the master's comprehensive exam. Under either plan a student may take 6 hours in a minor field. Students are expected to work out an acceptable program of course work with their advisor. Specific courses depend on the student's background and field of specialization, but four of the courses must satisfy a distribution requirement.

### Doctor of Philosophy Degree

Admission requirements for this program are listed under General Admission Requirements. Students in this program must pass preliminary examinations in three subareas of computer science to be eligible for admission to PhD candidacy. The foreign language requirement is the equivalent of four college semesters; a detailed statement is available from the computer science department. A minimum of 30 semester hours in courses numbered 5000 or above is required for the degree, but the number of hours in formal courses are ordinarily greater than that total. Specific courses depend on the student's background and field of specialization.

Following the formal course work, a student must pass a comprehensive examination aimed primarily at determining whether the student is adequately prepared to begin doctoral thesis work.

Finally, students who have completed a minimum of 30 semester hours are expected to prepare a doctoral thesis based on original research in the field of computer science. After the thesis has been completed, an oral final examination on the thesis and related topics is conducted by a committee of at least five graduate faculty members.

Further details on either the master's or PhD degree programs are available at [www.cs.colorado.edu](http://www.cs.colorado.edu).

### Department Computing Facility

The Department of Computer Science supports its own domain, [www.cs.colorado.edu](http://www.cs.colorado.edu), which is a 10/100/1000 MB network linked to the campus and the rest of the world through a gigabit connection. The department has a variety of computing facilities for use by faculty, staff, and students. These include general purpose computing labs provided by the university, additional instructional labs and administrative computing resources provided by the department, and specialized labs dedicated to the work of individual research groups. A wide variety of computing resources are available so that students have the opportunity to learn about and use cutting-edge equipment and software.

## Electrical, Computer, and Energy Engineering

Electrical, computer, and energy engineering is about the science and technology of information and energy. Two undergraduate curricula lead to bachelor's degrees: one in electrical engineering, and another in electrical and computer engineering. These curricula are revised frequently to keep pace with changes in this dynamic field.

Up-to-date curricula and policies are contained in the department's *HELP! Guide*, available through the department and on the Web at [ece.colorado.edu](http://ece.colorado.edu).

### Bachelor's Degree Requirements

A minimum of 128 semester hours must be completed for either the BS in electrical engineering (EE) or the BS in electrical and computer engineering (ECE).

Students in both undergraduate degree programs take the same courses in their freshman and sophomore years. They also begin the sequence of core courses that covers the sophomore and junior years. With this background, students are then able to specialize—or diversify—beginning in the second semester of the junior year or in the senior year. EE majors take two junior-level elective courses that prepare them for three senior theory and two senior lab elective courses in addition to the electrical engineering capstone design lab or the electrical and computer engineering design lab. These senior courses may be chosen from the following areas: biomedical engineering; communication and digital signal processing; computer engineering and VLSI; electromagnetic fields; electronics; optics; power and power electronics; renewable energy; solid-state materials and devices; and systems and controls.

For ECE majors, the senior elective courses are: two computer science courses; computer organization; switching and finite automata; and the appropriate capstone design lab course.

Practical experience in well-equipped laboratories augments the theoretical approach throughout the program. Students are encouraged to develop interests outside their electrical engineering specialties by enrolling in nontechnical courses in other colleges of the university. They are encouraged to participate in college and university activities, as well as in meetings of the two very active electrical engineering technical societies (IEEE and HKN).

In just four years it is impossible to study all areas in detail. Qualified students may specialize further by pursuing a graduate program or by taking continuing education courses after completing the BS degree requirements. A graduating senior with high scholarship can finish a master's degree in electrical engineering with about one additional full year of work at any of the nation's major universities. Another option for especially well-qualified students is the department's BS/MS program, which allows early admission to the MSEE program during the junior year. This option is described below.

### Program Objectives for a BS Degree in Electrical Engineering (EEEN)

1. Graduates will be situated in growing careers involving the design, development or support of electrical or electronic systems, devices, instruments, or products, or will be successfully pursuing an advanced degree.

Graduates attaining the EE degree will have comprehensive knowledge and experience in the concepts and design of electrical and electronic devices, circuits, and systems. This is achieved through a sequence of required courses in these areas, culminating in a major design project incorporating realistic engineering constraints. Moreover, graduates will have advanced, specialized knowledge and skills in elective areas such as communications and digital signal processing, control systems, analog and digital integrated circuit design, semiconductor devices and optoelectronics electromagnetics and wireless systems, power electronics, renewable energy, bioelectronics, and digital systems.

EE graduates will have attained other professional skills that will be useful throughout their careers, including verbal and written communication and the ability to function on multidisciplinary teams.

The EE curriculum is rich in laboratory work. EE graduates will have achieved extensive practical experience in the laboratory techniques, tools, and skills that provide a bridge between theory and practice.

2. **Graduates will have advanced professional standing based on their technical accomplishments, and will have accumulated additional technical expertise to remain globally competitive.**

EE graduates experience a curriculum that contains a broad core of classes focused on mathematical and physical principles that are fundamental to the field of electrical engineering. Hence, they understand the physical and mathematical principles underlying electrical and electronic technology, and are able to analyze and solve electrical engineering problems using this knowledge. In addition to basic classes in mathematics, science, and computing, the EE curriculum includes a sequence of courses in analog and digital electronic circuits and systems, and electromagnetic fields.

3. **Graduates will have demonstrated professional and personal leadership and growth.**

To lay the foundation for a long career in a rapidly changing field, a broad background of fundamental knowledge is required. This is achieved in the EE curriculum through a sequence of required courses in mathematics, physics, chemistry, and the EE core. In addition, the graduate must be capable of lifelong learning; this is taught through assignments and projects that require independent research and study.

The curriculum includes a significant component of electives in the humanities and social sciences. EE graduates will have knowledge of the broader contemporary issues that impact engineering solutions in a global and societal context. They will have the verbal and written communication skills necessary for a successful career in industry or academia. Graduates also understand the meaning and importance of professional and ethical responsibility.

#### *Program Objectives for a BS Degree in Electrical and Computer Engineering (ECEN)*

1. Graduates will be situated in growing careers involving the design, development, or support of electrical or electronic systems, devices, instruments, or products, or will be successfully pursuing an advanced degree.

Graduates attaining the ECE degree will have comprehensive knowledge and experience in the concepts and design of electrical and electronic devices, circuits, and systems. Besides emphasizing computer hardware and software, the ECE curriculum also emphasizes design, integration, implementation, and application of computer systems, as well as experience in software development. This is achieved through a sequence of required courses in these areas, culminating in a major design project incorporating realistic engineering constraints. The curriculum also provides opportunities for specialization in areas such as compiler design, embedded systems, software engineering, and VLSI design, as well as in the electrical engineering specialties.

ECE graduates will have attained other professional skills that will be useful throughout their careers, including verbal

and written communication and the ability to function on multidisciplinary teams.

The ECE curriculum is rich in laboratory work. ECE graduates will have achieved extensive practical experience in the laboratory techniques, tools, and skills that provide a bridge between theory and practice.

2. **Graduates will have advanced professional standing based on their technical accomplishments, and will have accumulated additional technical expertise to remain globally competitive.**

ECE graduates experience a curriculum that contains a broad core of classes focused on mathematical and physical principles that are fundamental to the field of electrical and computer engineering. Hence, they understand the physical and mathematical principles underlying electrical and electronic technology and computer systems, and are able to analyze and solve electrical and computer engineering problems using this knowledge. In addition to basic classes in mathematics, science, and computing, the ECE curriculum includes a sequence of courses in analog and digital electronic circuits and systems, electromagnetic fields, probability, computer software, and computer design and architecture.

3. **Graduates will have demonstrated professional and personal leadership and growth.**

To lay the foundation for a long career in a rapidly changing field, a broad background of fundamental knowledge is required. This is achieved in the ECE curriculum through a sequence of required courses in mathematics, physics, chemistry, and the ECE core. In addition, the graduate must be capable of lifelong learning; this is taught through assignments and projects that require independent research and study.

The curriculum includes a significant component of electives in the humanities and social sciences. ECE graduates will have knowledge of the broader contemporary issues that impact engineering solutions in a global and societal context. They will have the verbal and written communication skills necessary for a successful career in industry or academia. Graduates also understand the meaning and importance of professional and ethical responsibility.

#### *Biomedical Engineering Option and Premedical Studies in ECEE*

The biomedical engineering option, available to both EEEN and ECEN majors, focuses on the application of engineering concepts to the improvement and protection of health. Successful completion of this option is noted on a student's transcript, and may meet medical school requirements. Course work in the ECEN/EEEN curriculum is coupled with specialized courses linking electrical engineering to such biomedical applications as neural signals and systems, bioeffects of electromagnetic fields, and therapeutic and diagnostic uses of bioelectric phenomena. Undergraduates may also undertake independent study in these areas.

Students interested in biomedical engineering may receive elective credit for two semesters of biology if they also complete two bioengineering courses from the ECEN/EEEN offerings. One of these ECEN/EEEN courses can also be used to satisfy course distribution requirements. The basic biomedical engineering option is thus composed of two semesters of biology and two ECEN/EEEN bioengineering courses taken in lieu of electives.

Students who wish to complete course requirements for medical (or dental, veterinary, etc.) school should add two semesters of organic chemistry to the ECEN/EEEN biomedical engineering option. Premedical ECEN/EEEN students may petition to have these courses substituted for other electives.

Interested students are urged to contact the departmental biomedical engineering advisor for additional information.

### **BS/MS Program in Electrical and Computer Engineering**

The concurrent BS/MS program in electrical and computer engineering enables especially well qualified EEEN and ECEN majors to be admitted to the MS program during the junior year of their BS program, and to work simultaneously towards BS and MS degrees in electrical engineering. This program allows for early planning of the MS portion of the student's education, taking graduate courses as part of the BS degree, more flexibility in the order in which courses are taken, and more efficient use of what would otherwise be a final semester with a light credit-hour load.

### **Curriculum for BS (EE)**

The following information may be changed by the time this catalog is printed and distributed. Up-to-date policies are contained in the department's *HELP! Guide*, which is given to students who enter the program.

#### *Required Courses* *Semester Hours*

#### **Freshman Year**

##### **Fall Semester**

APPM 1350 Calculus 1 for Engineers . . . . .	4
ECEN 1030 C Programming for EE/ECE . . . . .	4
ECEN 1100 Freshman Seminar . . . . .	1
PHYS 1110 General Physics . . . . .	4
Humanities or social science elective . . . . .	3

##### **Spring Semester**

APPM 1360 Calculus 2 for Engineers . . . . .	4
CHEM 1221 General Chemistry Lab for Engineers . . . . .	2
CHEN 1211 General Chemistry for Engineers . . . . .	3
Freshman elective . . . . .	3-4
Humanities or social science elective . . . . .	3

#### **Sophomore Year**

##### **Fall Semester**

APPM 2360 Introduction to Differential Equations with Linear Algebra . . . . .	4
ECEN 2120 Computers as Components . . . . .	5
ECEN 2250 Circuits/Electronics 1 . . . . .	5
Humanities or social science elective . . . . .	3

##### **Spring Semester**

APPM 2350 Calculus 3 for Engineers . . . . .	4
ECEN 2260 Circuits/Electronics 2 . . . . .	5
ECEN 3100 Digital Logic . . . . .	5
Humanities or social science elective . . . . .	3

#### **Junior Year**

##### **Fall Semester**

ECEN 3300 Linear Systems . . . . .	5
ECEN 3400 Electromagnetic Fields and Waves . . . . .	5
ECEN 3810 Introduction to Probability Theory . . . . .	3
Free elective . . . . .	2

##### **Spring Semester**

ECEN 3250 Circuits 3 . . . . .	5
ECEN elective . . . . .	3
PHYS 2130 Modern Physics . . . . .	3
WRTG 3030 Writing on Science and Society . . . . .	3
Free elective . . . . .	3

#### **Senior Year**

##### **Fall Semester**

ECEN elective . . . . .	3
Humanities or social science elective . . . . .	3
Two senior-level ECEN theory courses, one of which may be the ECE elective . . . . .	6
Senior-level ECEN laboratory course . . . . .	2
Technical elective . . . . .	3

##### **Spring Semester**

ECEN 4610 Capstone Design Laboratory . . . . .	3
Senior-level ECEN theory course . . . . .	3
Senior-level ECEN lab course . . . . .	2
Humanities or social science elective . . . . .	3
Technical electives . . . . .	4

**Minimum total hours for degree . . . . . 128**

### **Curriculum for BS (ECE)**

Freshman year is the same as for BS (EE).

#### *Required Courses* *Semester Hours*

#### **Sophomore Year**

##### **Fall Semester**

APPM 2360 Introduction to Differential Equations with Linear Algebra . . . . .	4
ECEN 2120 Computers as Components . . . . .	5
ECEN 2250 Circuits/Electronics 1 . . . . .	5
Humanities or social science elective . . . . .	3

##### **Spring Semester**

APPM 2350 Calculus 3 for Engineers . . . . .	4
ECEN 2260 Circuits/Electronics 2 . . . . .	5
ECEN 3703 Discrete Math for Computer Engineers . . . . .	3
Humanities or social science elective . . . . .	3

#### **Junior Year**

##### **Fall Semester**

CSCI 2270 Data Structures . . . . .	4
ECEN 3100 Digital Logic . . . . .	5
ECEN 3300 Linear Systems . . . . .	5
ECEN 3810 Introduction to Probability Theory . . . . .	3

##### **Spring Semester**

ECEN 3250 Circuits/Electronics 3 . . . . .	5
ECEN 3400 Electromagnetic Fields and Waves . . . . .	5
ECEN 4593 Computer Organization . . . . .	3
WRTG 3030 Writing on Science and Society . . . . .	3

#### **Senior Year**

##### **Fall Semester**

ECEN 4610 Capstone Design Laboratory . . . . .	3
ECE lab elective . . . . .	2
ECE theory elective . . . . .	3
PHYS 2130 Modern Physics . . . . .	3
Humanities or social science elective . . . . .	3
Free elective . . . . .	3
Technical elective . . . . .	3

##### **Spring Semester**

Technical elective . . . . .	3
ECEN 4610 Capstone Design Laboratory . . . . .	3
Humanities or social science elective . . . . .	3
Free elective . . . . .	3
Software elective . . . . .	3

**Minimum total hours for degree . . . . . 128**

### **Career Opportunities**

A degree in electrical engineering or electrical and computer engineering provides graduates the opportunity to enter the profession of engineering and to engage in work as a design, production, testing, consulting, research, teaching, or management professional in a wide variety of careers in the computer industry, telecommunications, instruments, the power and re-

newable energy industry, the biomedical industry, aerospace, and academia. Some graduates also go on to develop careers in other professions like law and medicine.

Examples of career opportunities include development of new electrical or electronic devices, instruments, or products; design of equipment or systems; production and quality control of electrical products for private industry or government; sales or management for a private firm or government; and teaching and research in a university.

### Graduate Degree Programs

Electrical engineering graduate programs leading to ME, MS, and PhD degrees include the areas of biomedical engineering; communications and signal processing; computer engineering; dynamics and controls; electromagnetics; RF and microwaves; optics and photonics; power electronics and renewable energy systems; remote sensing; nanostructures and devices; and VLSI/CAD.

Close cooperation with the National Institute of Standards and Technology (NIST), the National Oceanographic and Atmospheric Administration (NOAA), the National Renewable Energy Laboratory (NREL), the National Nanotechnology Infrastructure Network (NNIN), and Colorado Front Range industrial organizations in communications, computers, and instrumentation enhances the graduate program, and both teaching and research capabilities are strengthened by the addition of adjunct faculty members from these institutions.

### Requirements for Advanced Degrees

A minimum undergraduate GPA of 3.000 is required for application to the master's program. Minimum requirements for admission to the PhD program include a 3.500 undergraduate GPA, good GRE scores, and demonstration of research ability. Exceptional students with a BS degree are encouraged to apply directly to the PhD program. Information and application forms may be obtained by going to [ecee.colorado.edu/academics/grad/admission.html](http://ecee.colorado.edu/academics/grad/admission.html). Qualified students in their senior year at the University of Colorado and within 18 hours of graduation may be admitted into the graduate program and apply graduate-level credit hours above the 128-semester-hour BS requirement toward an advanced degree. Students formally accepted into the graduate program are assigned to program advisors.

Master's students may choose either an MS thesis option under Plan I or a nonthesis option of 30 hours under Plan II. The ME program is discussed in the College of Engineering and Applied Science general section on graduate study.

All students accepted into the PhD program must take the PhD preliminary examination the first time it is offered (usually in January). The exam covers undergraduate electrical and computer engineering, computer science, math and physics, and a student's designated area of specialization. Further information is available in the ECEE graduate office.

### Professional Certificate Programs

Professional Certificate Programs are offered in embedded systems, power electronics, and software engineering. For more information, see Professional Certificate Programs in the Graduate School section.

### Research Centers

#### *Colorado Power Electronics Center (CoPEC)*

Since it was founded in 1983, the power electronics group at the University of Colorado has maintained a tradition of innova-

tive design-oriented and application-driven research. Colorado Power Electronics Center (CoPEC) activities now span the range of applications from high-efficiency milliwatt converters for portable battery-operated systems, to hundreds or thousands of watts for computer, aerospace, telecommunications, medical, and automotive power conversion, to hundreds of kilowatts for wind generation systems.

Our current research activities include projects in high-efficiency, high-power converter technology, power electronics for portable, battery-operated systems, converter modeling and computer-aided analysis, low harmonic rectifier technology for single-phase and three-phase applications, and advanced control techniques and their mixed-signal ASIC implementation. We collaborate with other research groups at the University of Colorado, including those in machines and power systems, microelectronics packaging, EMI, control, and semiconductor devices. For more information call **303-492-7327** or visit [ece.colorado.edu/~pwrelect](http://ece.colorado.edu/~pwrelect).

#### *The University of Colorado Center for Environmental Technology (CET)*

Understanding and managing the environment—whether for agriculture, health, water resources, disaster mitigation, energy generation, transportation, weather forecasting, climate modeling, or biodiversity—requires accurate knowledge of many variables on a wide range of time and space scales. Measurements for environmental purposes are made either using in situ or remote sensors, and rely upon a variety of different means, including acoustic and electromagnetic waves, point measurements and wide-area imaging, and active and passive systems. A variety of different types of platforms can be used for environmental observation, including ships and submersibles, aircraft (both manned and unmanned), spacecraft, and stationary sites.

Research and educational activities at the CU Center for Environmental Technology are focused on developing sensors, systems of sensors, and associated hardware and algorithms for environmental observation with a focus on new remote and in situ techniques to meet contemporary scientific and applications goals. This is accomplished by direct involvement of CU faculty, CET engineering staff, and undergraduate and graduate students on the development of sensing systems to meet the observational needs of a number of government and industry sponsors. CET training involves close interaction between students and experienced professional engineers, practicing scientists, and CU faculty.

The CET was established in 2006 with a major donation of equipment from the NOAA Earth System Research Laboratory, and has members, associates, and students from within the broad earth science and engineering communities of Colorado. For further information contact the CET director at **303-492-9688** or visit [cet.colorado.edu](http://cet.colorado.edu).

#### *Center for Research and Education in Wind (CREW)*

Launched in 2009, CREW is a consortium of over 70 wind energy researchers and educators from four institutions—the University of Colorado at Boulder (lead institution), the National Renewable Energy Laboratory, the Colorado School of Mines, and Colorado State University. In CREW, faculty and researchers from the four institutions have come together to work to address the research and operational issues of wind energy in a coordinated manner as well as train a new generation of scientists, engineers, and managers. The center has also formed partnerships with the National Center for Atmospheric Research and the National Oceanic and Atmospheric Adminis-



tration. Its research thrusts include atmosphere sciences, wind turbine and wind farm model development and validation, control of wind energy systems, electrical systems, and turbine testing, and a center-wide thrust on education and outreach. For more information visit [www.coloradocollaboratory.org/crew.html](http://www.coloradocollaboratory.org/crew.html).

## Research and Instructional Equipment

The department's special equipment and facilities include a class 1000 clean room facility for epitaxial growth and fabrication of microwave and optical devices; high-vacuum and vacuum deposition equipment for thin-films research; an integrated circuits laboratory; ion implantation equipment; crystal growing facilities; a modern systems laboratory; a laboratory for data storage research; a digital system design laboratory; a power electronics research laboratory; undergraduate laboratories in circuits, electronics; power electronics; digital signal processing and communications; enabled systems; microwaves; a holography and optics laboratory; an advanced optical metrology lab; numerous special purpose computers; mini- and microprocessors and a computer laboratory; a roof-mounted antenna range; a special microscope for laser manipulation of microorganisms in vivo; and a bio-microwave laboratory.

The Department of Electrical, Computer, and Energy Engineering has a large variety of computing equipment to support its research and instructional activities. In addition to specialized computing equipment, this includes several hundred PC, Macintosh, and SUN computers, a department server, and a student server. These machines are connected to the campuswide ethernet network.

## Engineering Management

The engineering management graduate curriculum offers a master of engineering degree to students from a variety of engineering and science backgrounds. The goal is to prepare technical professionals with a minimum of two years of post-baccalaureate work experience for advancement into management positions. Areas of concentration are available in managing innovation, project management, performance excellence, engineering entrepreneurship, quality systems, software management, and Six Sigma methodologies. The program is available via distance learning as well as on campus. Go to [emp.colorado.edu](http://emp.colorado.edu) for more information.

## Engineering Physics

### Bachelor's Degree Requirements

The engineering physics program focuses on the foundations of modern technology. The program prepares students for research, development, and entrepreneurial careers in many frontier areas of engineering, including quantum devices, ultra fast lasers, adaptive optics, cryogenic electronics, computer simulation of physical systems, solar cells, magnetic storage technology, micro-mechanical systems, and molecular electronics. All students study the core theoretical subjects of mechanics, electricity and magnetism, thermal physics, and quantum mechanics, supplemented by courses in mathematics, computation, and laboratory technique. The program can be tailored to a student's interests through electives in engineering, physics, or other sciences.

During the freshman and sophomore years, students receive a broad introduction to physics and chemistry as well as five semesters of applied mathematics and mathematical methods in physics. Starting in the junior year, students take a full year

of electrodynamics, a year of quantum mechanics, a semester of classical mechanics, a semester of thermodynamics and statistical mechanics, a year of physical chemistry, and an additional semester of advanced mathematics. Laboratory courses emphasize student-developed and student-designed independent projects where students use the knowledge acquired to build apparatus of their own choosing. The Advanced Laboratory (PHYS 4340) provides students with hands-on experience with optical spectroscopy, nuclear magnetic resonance, scanning tunneling microscopy, and laser cooling and trapping of atoms, among other experiments. The program encourages the formation of student research collaborations with faculty in the pursuit of senior thesis projects. Recent projects include research in pulsed laser deposition of high-temperature superconductors, electron diffraction studies of protein structure, and lattice distortion theory of colossal magnetoresistance materials.

Additional information about the bachelor's degree in engineering physics may be obtained from the physics department, Duane Physics E-1B32, by phone at **303-492-6953**, or online at [www.colorado.edu/physics](http://www.colorado.edu/physics).

Students who plan to become registered professional engineers should check the requirements for registration in their state before choosing their engineering electives.

In order to earn a bachelor's degree in engineering physics, students must complete the curriculum in the undergraduate major programs available through the Department of Physics. (Some variations may be possible; see an engineering physics advisor.) In addition, students must meet the general undergraduate degree requirements of the College of Engineering and Applied Science. Included in the general requirements is the achievement of a GPA of at least 2.000 in the student's physics courses.

The Department of Physics offers a minor in physics. A detailed plan can be found at [www.colorado.edu/physics](http://www.colorado.edu/physics).

### Curriculum for BS (Engineering Physics)

Below is a typical schedule only. For a complete description of the engineering physics course requirements, go to [www.colorado.edu/physics](http://www.colorado.edu/physics).

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers . . . . .	4
MCEN 1025 or AREN 1027 CAD/Engineering Drawing (Note 1). . . . .	3
PHYS 1110 General Physics 1 . . . . .	4
Humanities or social science electives (Note 2). . . . .	6
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
CSCI 1300 Computer Science 1: Programming (Note 1) . . . . .	4
PHYS 1120 General Physics 2 . . . . .	4
PHYS 1140 Experimental Physics . . . . .	1
Humanities or social science elective (Note 2) . . . . .	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2350 Calculus 3 for Engineers . . . . .	4
CHEM 1221 General Chemistry Lab for Engineers (Note 5) . . . . .	2
CHEM 1211 General Chemistry for Engineers (Note 5). . . . .	3
PHYS 2150 Experimental Physics . . . . .	1
PHYS 2170 Foundations of Modern Physics . . . . .	3
Elective (Note 3) . . . . .	3
<b>Spring Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra. . . . .	4
PHYS 2210 Classical Mechanics and Math Methods 1 . . . . .	3
Elective (Note 3) . . . . .	3
Humanities or social science elective (Note 2) . . . . .	3

**Junior Year****Fall Semester**

CHEM 4521 Physical Chemistry (Note 5) . . . . .	3
PHYS 3210 Classical Mechanics and Math Methods 2 . . . . .	3
PHYS 3310 Principles of Electricity and Magnetism 1 . . . . .	3
PHYS 3330 Junior Laboratory . . . . .	2
Upper-division mathematics elective . . . . .	3
Elective (Note 3) . . . . .	3

**Spring Semester**

CHEM 4541 Physical Chemistry Lab (Note 5) . . . . .	2
PHYS 3220 Quantum Mechanics . . . . .	3
PHYS 3320 Principles of Electricity and Magnetism 2 . . . . .	3
Physics elective (Note 4) . . . . .	6
Elective (Note 3) . . . . .	3

**Senior Year****Fall Semester**

PHYS 4230 Thermodynamics and Statistical Mechanics . . . . .	3
PHYS 4410 Atomic and Nuclear Physics . . . . .	3
Electives (Note 3) . . . . .	8
WRWG 3030 Writing on Science and Society . . . . .	3

**Spring Semester**

Engineering electives (Note 3) . . . . .	10-12
Physics electives (Note 4) . . . . .	3-5
Humanities or social science elective (Note 2) . . . . .	3

**Minimum total hours for the degree . . . . . 128**

**Curriculum Notes**

1. *Engineering physics computer science/drafting requirement (5–7 hours) is as follows: CSCI 1300-4 or GEEN 1300-3, plus AREN 1027-3 or MCEN 1025-3 or second computer science course (of at least 3 credit hours) other than CSCI 1300 or GEEN 1300.*
2. *A total of 18 credit hours of humanities or social science courses is required. See [engineering.colorado.edu/hss](http://engineering.colorado.edu/hss) for specific requirements.*
3. *Engineering electives: 17–20 engineering elective hours above and beyond the required courses for engineering physics plan 4, including one upper-division laboratory course. Total hours required in engineering electives plus the required computer sciences and drafting hours: 25.*
4. *Nine hours of physics electives are required. For details, see [www.colorado.edu/physics](http://www.colorado.edu/physics).*
5. *The 10-hour chemistry requirement may also be met with CHEM 1113/1114 and 1133/1134.*

**Environmental Engineering**

Environmental engineers play a vital role in maintaining the quality of both human environmental systems and the natural environment. Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems impacting the biosphere, land, water, and air quality. Environmental issues affect almost all commercial and industrial sectors, and are a central concern for the public, for all levels of government, and in international relations. These issues include safe drinking water, wastewater processing, solid and hazardous waste disposal, outdoor air pollution, indoor air pollution and transfer of infectious diseases, human health and ecological risk management, prevention of pollution through product or process design, and renewable and sustainable energy sources.

To address these challenges, environmental engineers often encounter challenging problems that must be solved in data-poor situations as members of multidisciplinary teams. Environmental problems require creative solutions blended with contributions from scientists, lawyers, business people, and the public. Good communication skills, as well as technical proficiency, are essential for success in this arena. In addition, technology designed to address environmental problems is marketed

globally, opening up increasing opportunities for international work in the environmental engineering field.

The faculty of the Environmental Engineering Program (EVEN) is drawn from the Departments of Civil, Environmental, and Architectural Engineering; Mechanical Engineering; Chemical and Biological Engineering; and Aerospace Engineering. The EVEN faculty, its Professional Advisory Board (representing prospective employers of its graduates), and EVEN alumni and current students have contributed to the creation of the program's mission and the educational objectives of the EVEN BS degree.

**Mission**

The mission of the EVEN Program is to provide a multidisciplinary undergraduate environmental engineering education that emphasizes mastery of principles and practices, inspires service for the global public good, endows a desire for lifelong learning, and prepares students for broad and dynamic career paths in environmental engineering.

**Educational Objective**

The educational objective of the environmental engineering bachelor of science degree is to produce graduates who reach the following achievements three to five years after graduation:

- become established in professional careers or earn advanced degrees;
- apply multidisciplinary approaches to manage the unique challenges and balance the competing social, political, economic, and technical goals of environmental problems and solutions; and
- serve the needs of our society and protect the future of our planet in an ethical manner.

**Program Outcomes**

The Environmental Engineering Program demonstrates that its graduates:

- have sufficient knowledge of engineering, mathematics, and science fundamentals to succeed in environmental engineering practice or advanced degrees;
- have sufficient knowledge of advanced environmental engineering applications and complementary natural sciences to succeed in environmental engineering practice or advanced degrees;
- have sufficient knowledge of engineering approaches to problem solving (hypothesis, design, testing; team work) to succeed in environmental engineering practice or advanced degrees;
- have sufficient knowledge of basic engineering skills and tools (computer, laboratory, and field) to succeed in environmental engineering practice or advanced degrees;
- have adequate writing and oral presentation skills to succeed in environmental engineering practice or advanced degrees;
- have adequate understanding of the social, economic, political, and ethical context of environmental problems and solutions;
- have adequate opportunity to include service at the local, state, national, or global levels as an important part of their environmental engineering education; and

- recognize the importance of life-long learning by seeking advanced degrees and pursuing continuing education.

## Bachelor's Degree Requirements

The bachelor of science degree in environmental engineering (EVEN) at the University of Colorado provides preparation for professional proficiency or graduate training in environmental engineering in a four-year curriculum. The curriculum includes courses in engineering fundamentals and applications, advanced mathematics, chemistry, physics, biology, geology, and the arts and humanities.

Courses specific to environmental engineering practice include water chemistry, microbiology, and air pollution control. In addition, environmental engineering requires hands-on laboratory experiences, up-to-date skills in the use of computers for modeling and data analysis, and experience in the design of environmental engineering systems. Many of the required engineering courses in the bachelor of science curriculum are culled from aerospace engineering sciences; chemical and biological engineering; civil, environmental, and architectural engineering; and mechanical engineering.

The curriculum also includes three technical electives, three option courses, and one free elective. Technical elective courses include a broad range of science and engineering courses, and must include an earth sciences course. The option courses represent an area of specialization in environmental engineering selected by the student beginning in the junior year. The curriculum includes six sets of options:

Air Quality
Applied Ecology
Chemical Processing
Energy
Environmental Site Characterization and Remediation
Water Resources and Treatment

In addition to these prescribed options, students may also formulate their own sequence of option courses (referred to as a "special option") representing an area of specialization not included in the six sets of option courses listed above. This selection must be done by petition to the Environmental Engineering Program.

Students in the program are also encouraged to participate in research through independent study projects, the Undergraduate Research Opportunities Program (UROP), or as undergraduate research assistants in sponsored research programs. Students are required to take the Fundamentals of Engineering (FE) exam when they are within 32 credit hours of graduation.

## Curriculum for the Bachelor of Science in Environmental Engineering

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers . . . . .	4
CHEM 1211 General Chemistry for Engineers . . . . .	3
CHEN 1221 General Chemistry Laboratory . . . . .	2
EVEN 1000 Introduction to Environmental Engineering (Note 4) . . . . .	1
GEEN 1400 Engineering Projects . . . . .	3
Humanities and social science elective (Note 1) . . . . .	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
GEEN 1300 Introduction to Engineering Computing . . . . .	3
PHYS 1110 General Physics 1 . . . . .	4
Humanities and social science elective (Note 1) . . . . .	3

Technical elective (Note 2) . . . . .	3
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## Sophomore Year

### Fall Semester

APPM 2350 Calculus 3 for Engineers . . . . .	4
PHYS 1120 General Physics 2 . . . . .	4
PHYS 1140 Experimental Physics 1 . . . . .	1
Solid mechanics: CVEN 2121 Analytic Mechanics, GEEN 3851 Statics for Engineers, or MCEN 2023 Statics and Structures . . . . .	3
Humanities and social science elective (Note 1) . . . . .	3

### Spring Semester

APPM 2360 Introduction to Differential Equations with Linear Algebra . . . . .	4
CHEM 4521 Physical Chemistry for Engineers (Note 4) . . . . .	3
CHEN 2120 Material and Energy Balances . . . . .	3
CVEN 3414 Fundamentals of Environmental Engineering . . . . .	3
Humanities and social science elective (Note 1) . . . . .	3

## Junior Year

### Fall Semester

CVEN 4404 Water Chemistry (Note 4) . . . . .	3
CVEN 4414 Water Chemistry Lab. . . . .	1

### Engineering Economics:

CVEN 4147 Engineering Economy and System Design, EMEN 4100 Business Methods and Economics for Engineers, or EVEN 4830 Technoeconomic Analysis for Environmental Engineering. . . . .	3
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### Fluid Mechanics:

CHEN 3200 Chemical Engineering Fluid Mechanics, CVEN 3313 Theoretical Fluid Mechanics, GEEN 3853 Fluid Mechanics for Engineers, or MCEN 3021 Fluid Mechanics . . . . .	3
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### Thermodynamics:

AREN 2110 Thermodynamics, CHEN 3320 Chemical Engineering Thermodynamics, GEEN 3852 Thermodynamics for Engineers, or MCEN 3012 Thermodynamics . . . . .	3
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### Required Communication Course:

WRTG 3030 Writing on Science and Society, WRTG 3035 Technical Communication and Design, GEEN 3000 Professional Communication for Engineers, HUEN 3100 Humanities for Engineers, or PHYS 3050 Writing in Physics . . . . .	3
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### Spring Semester

CVEN 4484 Introduction to Environmental Microbiology (Note 4) . . . . .	3
MCEN 4131 Air Pollution Control (Note 4) . . . . .	3

### Heat Transfer:

CHEN 3210 Chemical Engineering Heat Transfer or MCEN 3022 Heat Transfer . . . . .	3
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### Probability and Statistics:

APPM 4570 Statistical Methods, CHEN 3010 Applied Data Analysis, or CVEN 3227 Probability, Statistics, and Decision . . . . .	3
Option course I (Note 3) . . . . .	3

## Senior Year

### Fall Semester

CVEN 4444 Environmental Engineering Processes (Note 4) . . . . .	3
Humanities and social science elective (Note 1) . . . . .	3
Air or earth science laboratory or field course . . . . .	3
Option course II (Note 3) . . . . .	3
Technical elective II (Note 2) or Senior Thesis (Note 5). . . . .	3
Free Elective . . . . .	3

### Spring Semester

CVEN 4333 Engineering Hydrology (Note 4) . . . . .	3
CVEN 4424 Environmental Organic Chemistry . . . . .	3
CVEN 4434 Environmental Engineering Design (Note 4) . . . . .	3
Option course III (Note 3) . . . . .	3
Technical elective III (Note 2) or Senior Thesis (Note 5) . . . . .	3

**Minimum total semester hours . . . . . 128**

### Curriculum Notes

1. A total of 18 credit hours of humanities and social sciences electives is required. At least 9 hours must be at the upper-division (3000 or 4000) level, including the required communication course.
2. A total of 9 credit hours of technical electives is required. Three technical elective credits may be lower-division (1000-2000-level). Three technical elective credits

must be in the earth sciences, either lower or upper division. Remaining technical elective credits must be upper division in engineering, mathematics, or sciences. Independent study (EVEN 4840) may be completed as technical electives or senior thesis for up to 6 credits.

3. A list of courses for the Air Quality, Applied Ecology, Chemical Processing, Energy, Environmental Remediation, and Water and Wastewater Options is available in the program office.
4. Only offered in the semester shown (not including summer offerings).
5. A senior thesis may be completed with faculty approval if senior year technical electives are taken as independent studies on a single research topic.

### Concurrent Bachelor of Science/ Master of Science Degree

A concurrent EVEN BS/CVEN MS degree program is available in cooperation with the Department of Civil, Environmental, and Architectural Engineering. Students may apply to the program when they have completed 75–110 credit hours toward the undergraduate EVEN degree. Once accepted into the program, students are allowed to count 6 credit hours taken at the graduate level for both the environmental engineering BS and the civil engineering MS degrees, thus allowing them to obtain both degrees in a five-year curriculum.

## Mechanical Engineering

Space in the undergraduate mechanical engineering program is limited; some restrictions may apply.

### Bachelor's Degree Requirements

The educational objective of the undergraduate program in mechanical engineering is to prepare graduates so that, within three years of graduation, they will have successfully established themselves in professional careers and/or obtained a graduate degree, and will have begun to generate new knowledge or exercise leadership in their positions to the benefit of society.

Each graduate of the mechanical engineering program is expected to:

- apply knowledge of mathematics, science, and engineering;
- identify, formulate, and solve engineering problems;
- use computers to solve engineering problems;
- use modern instrumentation;
- design and conduct experiments, including the use of probability and statistics;
- understand contemporary issues in mechanical engineering;
- analyze and interpret data;
- design thermal systems, components, or processes to meet desired needs;
- design mechanical systems, components, or processes to meet desired needs;
- understand the processes used to manufacture products;
- understand contemporary issues in mechanical engineering;
- make effective oral presentations;
- write effectively;
- function effectively on multi-disciplinary teams;
- understand professional and ethical responsibility;
- understand the impact of engineering in a global and societal context; and
- engage in lifelong learning.

The undergraduate curriculum in mechanical engineering incorporates engineering science, physical science, mathematics, and the humanities and social sciences. The engineering science component provides basic theoretical and practical concepts in solid mechanics, materials, thermodynamics, fluid mechanics, design, and manufacturing. Required courses in engineering science, physical science, and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the profession and comprise three-fourths of the minimum curriculum requirement of 128 semester hours; they are complemented by four technical electives, five electives in the humanities and social sciences, a junior-level writing course, and a free elective.

Options in environmental and biomedical engineering are available for students interested in these interdisciplinary areas.

### Curriculum for BS (ME)

The following constitutes a representative course schedule for freshmen entering the program in fall 2007 or later.

Required Courses	Semester Hours
<b>Freshman Year</b>	
<b>Fall Semester</b>	
APPM 1350 Calculus 1 for Engineers . . . . .	4
CHEM 1221 General Chemistry Laboratory for Engineers. . . . .	2
CHEN 1211 General Chemistry for Engineers. . . . .	3
MCEN 1000 Introduction to Mechanical Engineering . . . . .	1
MCEN 1025 Computer-Aided Design and Fabrication. . . . .	3
Humanities or social science elective . . . . .	3
<b>Spring Semester</b>	
APPM 1360 Calculus 2 for Engineers . . . . .	4
GEEN 1300 Introduction to Engineering Computing . . . . .	3
GEEN 1400 First-year Engineering Projects. . . . .	3
PHYS 1110 General Physics 1 . . . . .	4
Humanities or social science elective . . . . .	3
<b>Sophomore Year</b>	
<b>Fall Semester</b>	
APPM 2350 Calculus 3 for Engineers . . . . .	4
MCEN 2023 Statics and Structures . . . . .	3
PHYS 1120 General Physics 2 . . . . .	4
PHYS 1140 Experimental Physics . . . . .	1
Humanities or social science elective . . . . .	3
<b>Spring Semester</b>	
APPM 2360 Introduction to Differential Equations with Linear Algebra . . . . .	4
MCEN 2024 Materials Science. . . . .	3
MCEN 2063 Mechanics of Solids . . . . .	3
PHYS 2130 General Physics 3 or general science elective . . . . .	3
Free elective . . . . .	3
<b>Junior Year</b>	
<b>Fall Semester</b>	
MCEN 3012 Thermodynamics . . . . .	3
MCEN 3017 Circuits and Electronics . . . . .	3
MCEN 3021 Fluid Mechanics . . . . .	3
MCEN 3030 Computational Methods . . . . .	3
WRWG 3030 Writing on Science and Society . . . . .	3
<b>Spring Semester</b>	
MCEN 3022 Heat Transfer . . . . .	3
MCEN 3025 Component Design . . . . .	3
MCEN 3037 Experimental Design and Data Analysis . . . . .	2
MCEN 3043 Dynamics . . . . .	3
MCEN 4122 Thermodynamics 2 . . . . .	3
Humanities or social science elective . . . . .	3
<b>Senior Year</b>	
<b>Fall Semester</b>	
MCEN 4026 Manufacturing Processes and Systems . . . . .	3
MCEN 4037 Measurements Laboratory . . . . .	2

MCEN 4043 System Dynamics . . . . .	3
MCEN 4045 Mechanical Engineering Design Project 1 . . . . .	3
Technical electives . . . . .	3
Humanities or social science elective . . . . .	3
<b>Spring Semester</b>	
MCEN 4085 Mechanical Engineering Design Project 2 . . . . .	4
MCEN 4047 Mechanical Engineering (Senior) Laboratory . . . . .	2
Technical electives . . . . .	9
<b>Minimum total hours for degree . . . . .</b>	<b>128</b>

## Graduate Degree Programs

The department offers master of science (MS) and doctor of philosophy (PhD) degree programs to students whose career plans include advanced practice, research and development, and/or teaching at the college or university level.

The combined BS/MS program allows qualified students to simplify obtaining the MS degree. Up to 6 hours of appropriate courses may be used to satisfy both degrees. Students may apply for this program in their junior year.

Students pursuing the degree of master of science in mechanical engineering may follow either Plan I, which requires the writing of a thesis, or Plan II, which involves only course work. A student following Plan I must complete a minimum of 24 semester hours of course work and 6 semester hours of thesis work; at least 15 semester hours of the course work must be in the mechanical engineering department. A student following Plan II must complete a minimum of 30 semester hours of course work, of which at least 18 semester hours must be in the mechanical engineering department. Up to 9 semester hours of graduate course work may be transferred from another accredited institution as long as those hours were not used to satisfy another degree requirement. Students should consult with an academic advisor to decide what course of study best meets their academic objectives.

A student pursuing the PhD in mechanical engineering must complete a minimum of 12 semester credit hours in courses numbered 5000 or above, beyond the MS degree requirements, as well as 30 semester hours of thesis work. Up to 21 semester hours of graduate course work may be transferred from another accredited institution; there is no credit limit for appropriate courses taken at the University of Colorado, such as those taken for the master of science degree.

Every student desiring to pursue the PhD degree must first pass a preliminary examination. As a part of this evaluation, students must pass written and oral examinations designed to test research and fundamental mechanical engineering competency. The oral examinations will be given by committees of at least two faculty members. Overall performance in the required examinations will determine *pass/fail* status.

After passing the preliminary examination, students continue their course work and prepare a written thesis prospectus. When ready, they take an oral comprehensive examination covering the graduate course work and the thesis prospectus. After passing the comprehensive examination, students are admitted into the PhD program and conduct original research required to satisfy the thesis requirement. This research culminates in the writing of the thesis, which students defend in a final examination.

PhD students are assigned an academic advisor to review their progress toward the degree. Students are expected to meet with the advisor at least once each semester prior to registration. Once students have selected a research topic for the thesis, academic advising is done by their thesis advisor. Additional information on graduate study may be found in the Graduate School section.

## Graduate Research

Research activities are concentrated in three contemporary themes: micro/nano scale engineering, energy/environment, and bioengineering. Faculty engage in these theme areas through three disciplinary areas of mechanical engineering: fluid mechanics/thermal sciences, solid mechanics/material sciences, and design/manufacturing. Faculty and students collaborate with universities and laboratories across the United States and throughout the world.

Example research efforts in micro/nano systems include: design and reliability of MicroElectroMechanical Systems (MEMS), nanosystems, carbon nanotubes, mechanical properties of nanowires, nanomaterial processing, nanocomposites, disk drive shock analysis, microporous membranes, polymer derived ceramics, active materials and structures, multi-scale computational fluids modeling, and MEMS/electronics packaging.

Example research efforts in energy/environment include: flame treatment of polymer films, microgravity combustion of metals, urban air quality modeling, indoor air pollution, and theoretical/computational fluid dynamics.

Example research efforts in bioengineering include: optical biopsy of prostate cancer, shape memory polymers/alloys, cardiovascular fluid/bio mechanics, MEMS-based biosensing, ultrasound imaging, device design, nanoparticle diagnostics, and metallic/polymer biomaterials. These efforts are facilitated by collaborations with the Anschutz Medical Campus of the University of Colorado Denver, the Children's Hospital, and the Colorado State Veterinary College.

Department research activities are supported by a wide range of industrial and federal agencies such as the National Science Foundation (NSF), Department of Energy (DOE), National Aeronautics and Space Administration (NASA), National Institute of Health (NIH), Air Force Office of Scientific Research (AFOSR), and Defense Agency Research Project Association (DARPA). Some research activities are carried out through interdisciplinary department research centers including the Joint Center for Combustion and Environmental Research (JCCER), Membrane Applied Science and Technology (MAST) Center, and Integrated Micro/Nanoelectro-mechanical Transducers (iMINT).

## Telecommunications

This interdisciplinary graduate curriculum offers a master of engineering or master of science degree to students from a variety of undergraduate backgrounds. Both degree programs ensure that students obtain an understanding of the latest aspects of technology, as well as social, economic, and business applications in the expanding fields of telecommunications and networking. This understanding is gained through course work, research, and laboratory studies.

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LLOYD D. FOSDICK, professor emeritus.

HAROLD N. GABOW, professor emeritus.

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OLIVER McBRYAN, professor emeritus.

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EVI NEMETH, associate professor emerita.

GARY J. NUTT, professor. BA, Boise State University; MS, PhD, University of Washington.

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WILLIAM M. WAITE, professor emeritus.

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## Electrical, Computer, and Energy Engineering

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FRANK S. BARNES, distinguished professor. BS, Princeton University; MS, Engineer Degree, PhD, Stanford University.

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W. THOMAS CATHEY, professor emeritus.

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## Engineering Management

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## Herbst Humanities

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## Mechanical Engineering

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SUBHENDU K. DATTA, professor emeritus.

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FRANK KREITH, professor emeritus.

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## Telecommunications

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BRAD BERNTHAL, associate clinical professor. BA, University of Kansas; JD, University of Colorado.

TIMOTHY X BROWN, director; professor. BS, Pennsylvania State University; MS, PhD, California Institute of Technology.

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## Engineering (General)

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NATHAN E. WRIGHT, director, access and recruitment. BA, University of Colorado at Boulder.

# Graduate School

*Stein Sture, vice chancellor for research and dean*

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school website: [www.colorado.edu/graduateschool](http://www.colorado.edu/graduateschool)

**G**RADUATE WORK at the University of Colorado began on a small scale in 1892. Following years of development, the Graduate School was organized in 1909 with a separate faculty. Each of the three campuses of the University of Colorado system now offers graduate degree programs, and a dean is in residence on each campus. The Graduate School at CU-Boulder is governed by its own set of Graduate School Rules.

## Degrees

The Graduate School of the University of Colorado at Boulder offers instruction leading to the following advanced degrees:

- Master of Arts (MA)
- Master of Business Administration (MBA) (through Leeds School of Business)
- Master of Engineering (ME)
- Master of Fine Arts (MFA)
- Master of Music (MMus)
- Master of Music Education (MMusEd)
- Master of Science (MS)
- Doctor of Audiology (AuD)
- Doctor of Musical Arts (DMusA)
- Doctor of Philosophy (PhD)

## Programs

### MA programs in:

- Anthropology
- Art History
- Asian Languages and Literature
  - Chinese
  - Japanese
- Classics
- Communication
- Comparative Literature
- Ecology and Evolutionary Biology
- \*Economics
- Education
  - Curriculum and Instruction
  - Education/Psychological Studies
  - Social, Multicultural, and Bilingual Foundations
- English (see MFA for Creative Writing)
  - English Literature
- French
- Geography
- German
- History
- Journalism
- Linguistics
- Mathematics
- \*Molecular, Cellular, and Developmental Biology
- Philosophy



- Political Science
  - International Affairs
  - Political Science
  - Public Policy
- \*Psychology
- Religious Studies
- \*Sociology
- Spanish
- Speech, Language, and Hearing Sciences
- Theatre

*\*Master's degree offered as part of the PhD program only.*

### ME programs in:

- Aerospace Engineering Sciences
- Chemical Engineering
- Computer Science
- Electrical Engineering
- Engineering Management
- Mechanical Engineering
- Telecommunications

### MFA programs in:

- Creative Writing
- Dance
- Studio Arts

### MMus

- Music

### MMusEd

- Music Education

### MS programs in:

- Aerospace Engineering Sciences
- Applied Mathematics
- Astrophysical and Planetary Sciences
- Atmospheric and Oceanic Sciences
- \*Biochemistry
- Business Administration
  - Accounting
  - Accounting–Taxation
- Chemical Engineering
- \*Chemistry
- Civil Engineering
- Computer Science
- Electrical Engineering
- Environmental Studies
- Geology
- Integrative Physiology
- Mechanical Engineering
- Museum and Field Studies
- Physics
- Telecommunications

*\*Master's degree offered as part of the PhD program only.*

**DAud**

Audiology

**DMusA**

Musical Arts

**PhD programs in:**

Aerospace Engineering Sciences  
 Anthropology  
 Applied Mathematics  
 Astrophysical and Planetary Sciences  
 Atmospheric and Oceanic Sciences  
 Biochemistry  
 Business Administration  
 Chemical Engineering  
 Chemical Physics  
 Chemistry  
 Civil Engineering  
 Classics  
 Cognitive Science  
 Communication  
 Communication-Media Studies (through Journalism)  
 Comparative Literature  
 Computer Science  
 Ecology and Evolutionary Biology  
 Economics  
 Education  
   Curriculum and Instruction  
   Education/Psychological Studies  
   Educational Foundations, Policy, and Practice  
   Equity, Education, and Cultural Diversity  
   Research and Evaluation Methodology  
 Electrical Engineering  
 English  
 Environmental Studies  
 French  
 Geography  
 Geology  
 Geophysics  
 History  
 Integrative Physiology  
 Linguistics  
 Mathematics  
 Mechanical Engineering  
 Molecular, Cellular, and Developmental Biology  
 Music  
   Music Education  
   Musicology  
 Neuroscience  
 Philosophy  
 Physics  
 Political Science  
 Psychology  
 Sociology  
 Spanish  
 Speech, Language, and Hearing Sciences  
 Technology, Media, and Society  
 Theatre

Inquiries regarding admission to graduate programs should be addressed to the graduate department in which the applicant wishes to study (see the *University of Colorado at Boulder Directory* for campus addresses or see [www.colorado.edu](http://www.colorado.edu)).

### Concurrent Bachelor's/Master's Degree Programs

Concurrent BS/MS and BA/MA degree programs are offered in several departments at CU-Boulder. These programs allow a

student to receive both a bachelor's and master's degree in five years of study without compromising the academic integrity of either degree.

Currently approved concurrent degree programs in arts and sciences include: applied mathematics, Asian languages and cultures, classics, cognitive psychology, ecology and evolutionary biology, engineering physics/physics, film/art history, French, Germanic studies, integrative physiology, linguistics, physics, mathematics, and religious studies; in business, accounting/accounting, finance/accounting, information systems/accounting, information systems/telecommunications; and all departments in engineering.

These concurrent degree programs are open only to highly qualified CU-Boulder undergraduates. Students are formally admitted at the end of their sophomore year or the beginning of their junior year. They are admitted through the admission procedure of their department and do not go through the normal process of admission to Graduate School. When students have completed the program requirements, they receive both a bachelor's and a master's degree simultaneously. Students wishing to continue studying toward a doctorate must formally apply for admission to the Graduate School.

Students interested in a concurrent bachelor's/master's program should inquire in the department.

## Academic Excellence

### Scholarships and Fellowships

CU-Boulder administers various forms of financial assistance for graduate students: fellowships, traineeships, scholarships, research and teaching assistantships, and awards from outside agencies.

**The Chancellor's Graduate Fellowship Program**, instituted in 1984–85, attracts outstanding students for graduate study at the University of Colorado. Selected students receive a stipend of \$20,000 for two academic years and a full waiver of all tuition, fees, and insurance. Recipients must be entering master's or doctoral degree students and be nominated by their department.

Additional fellowships are available from private sources. Fellowships, traineeships, and scholarships are also offered by some departments. Applications for financial support are due in the departments by the announced deadlines; most departments must receive applications by January 15.

For more about assistantships, see Financial Aid for Graduate Study. Information on other funding opportunities is available on the Graduate School website at [www.colorado.edu/graduateschool](http://www.colorado.edu/graduateschool).

## Academic Standards

### Grade Point Average

A student is required to maintain at least a *B* (3.00) average in all work attempted while enrolled in the Graduate School, and must have at least a 3.00 cumulative average to receive a graduate degree.

### Nonacceptable Grades

1. A student who receives a grade of *C* or below in a course may petition to repeat that course once, provided the course has not been previously applied toward a degree.
2. Courses in which grades below *B-* (2.700) are received are not accepted for doctoral programs.

3. Courses in which grades below C (2.000) are received are not accepted for master's degree programs or for the removal of academic deficiencies.
4. Courses taken toward the fulfillment of requirements for graduate degrees may not be taken *pass/fail*.

### Probation

A student whose cumulative GPA falls below 3.000 is placed on academic probation. The student has two semesters in which to raise the cumulative GPA to 3.000 or above. If the student's cumulative GPA is at or below 2.500, a dean's administrative stop is placed on the student's record, and the student may be withdrawn from course work for upcoming semesters.

If, after the two-semester probationary period, the student's cumulative GPA is still below 3.000 or if other conditions placed by the major department or Graduate School are not met, a dean's administrative stop will be placed on the student's record and he or she may be subject to dismissal.

A provisionally admitted student whose GPA falls below 3.000 has a dean's administrative stop placed on his or her record pending a review by the major department and the Graduate School.

### No Credit

Course work to be applied toward an advanced degree may not be taken for *no credit (NC)*. Courses taken for *no credit* cannot be used toward the minimum credit load requirement for full-time or half-time status.

### Pass/Fail

No course work to be applied toward an advanced degree may be taken *pass/fail*.

### Student Ethics

Students are expected to adhere to the highest codes of personal and professional ethics. Students who do not adhere to written guidelines regarding academic honesty and/or academic or research ethics may be dealt with according to the appropriate policy documents. Students found guilty of misconduct in any of these areas may have sanctions imposed, or may be dismissed from CU-Boulder.

## Admission and Enrollment Policies

### Application Procedures

Students seeking admission to a CU-Boulder master's or doctoral program apply directly to the appropriate department, not the Graduate School. An applicant for admission must present complete application materials that include:

1. Complete the graduate application, available online at [www.colorado.edu/prospective/graduate](http://www.colorado.edu/prospective/graduate).
2. Two official transcripts of all academic work completed to date.
3. A \$50 nonrefundable application fee (check or money order). No application will be processed unless this fee is paid. The application fee for international students is \$70.
4. Three or four letters of recommendation. Please check with your program to obtain the required number of recommendations needed.
5. Test scores and other materials as required by specific departments.

A completed application must be in the major department by the published deadline for the term for which admission is sought. Most departments have an application deadline that is several months before the start of the desired admission term. Qualified applicants may find that their application cannot be processed for a specific term if enrollment levels have been reached.

International students should have complete applications on file in the Office of Admissions before December 1 for the fall semester and October 1 for the spring semester.

### Admission Requirements

A graduate student may be admitted to CU-Boulder as either a regular degree student or a provisional degree student.

#### Regular Degree Students

Qualified students may be recommended for admission to regular degree status by approved programs of the Graduate School provided they meet the following criteria:

1. They hold a baccalaureate degree from an accredited college or university or have done work equivalent to that required for such a degree.
2. They show promise of ability to pursue advanced study and research, as judged by their scholastic record.
3. They have had adequate preparation to enter graduate study in the chosen field.
4. They have at least a 2.750 (on a 4.000 scale) undergraduate GPA (for engineering, 3.000). (NOTE: Applicants who cannot meet criterion 4 may still secure regular admission if they have completed 9 semester hours of relevant graduate course work with at least a 3.250 average.)
5. They meet additional requirements for admission established by the major department.

#### Provisional Degree Students

Students who do not meet the requirements for admission as regular degree students may be recommended for provisional degree status by their major department. With the concurrence of the dean of the Graduate School, these students are admitted for a probationary term of either one or two semesters of full-time study (or the equivalent for part-time students). At the end of the specified probationary period, provisional degree students must be either admitted to regular degree status or dismissed from the graduate program. Provisional students are subject to the same standards of performance required of regular degree students, plus any other requirements imposed by the program faculty as conditions of admission.

Credit earned by persons in provisional degree status may count toward a degree at CU-Boulder.

To meet the standard terms of provisional admission, the student must generally complete 12 hours in two semesters (or equivalent for part-time students) with a 3.000 cumulative GPA. Program faculty may recommend additional or alternative conditions as appropriate.

#### Admission to a Concurrent Bachelor's/ Master's Degree Program

A number of CU-Boulder departments offer concurrent bachelor's/master's degrees, which enable CU undergraduate students to pursue undergraduate and graduate programs simultaneously and to receive both degrees in a shorter time period than it would take to pursue them separately.

Highly qualified undergraduate students may be recommended for admission to a concurrent bachelor's/master's degree program at the end of their sophomore year or the beginning of their junior year. Such students are not formally admitted to the Graduate School. Standards for admission as well as eligibility to remain in the program are specified in each department's program guide.

### *Admission to a Dual Degree Program*

The Graduate School, in conjunction with the faculty of each department and the deans of schools and colleges where appropriate, approves dual degree programs that combine previously approved graduate degree programs in two areas or departments.

Qualified graduate students may be recommended for admission to an approved dual degree program upon meeting the qualifications of each graduate program and any special qualifications as outlined by each program's approved guidelines. Minimum standards and qualifications for admission and continuation may be found in each department's approved program guide. Students wishing to complete degrees in more than one department that have no approved dual degree program or interdisciplinary major combination must complete all the requirements for both degrees with no shared or overlapping course work.

### *Admission of Seniors*

A CU-Boulder senior who is not pursuing the concurrent bachelor's/master's degree, but who has satisfied the undergraduate residence requirement and does not need more than 6 semester hours of advanced subjects to meet the requirements for a bachelor's degree, may be admitted to the Graduate School.

### *Admission of Nondegree Students to Regular Degree Status*

Students with nondegree status who wish to apply for regular student status must complete their application for admission before completing 9 semester hours as nondegree students at CU-Boulder.

### *Admission of Former and Suspended Students*

Students who were previously admitted to a graduate degree program but who did not complete that degree and who have not been continuously registered at CU-Boulder must complete the following steps before being readmitted:

1. Clarify their status with the department to determine their eligibility to return and pursue the same degree.
2. Submit an application to the department (departmental approval is required) before enrollment levels are met or deadlines passed for the term in which they expect to return to CU-Boulder.

A regular degree student who is dismissed for failure to maintain a 3.000 grade point average is eligible to apply for readmission after one year. Approval or rejection of this application rests jointly with the student's major department and the dean of the Graduate School. The final decision will be made by the dean based on the recommendations of the department.

### *Students Transferring from Other CU Campuses*

Students transferring from another CU campus to CU-Boulder must apply to and be accepted by the Boulder campus.

### *Students Changing Major Departments*

Students who want to change major departments must apply to and be accepted by the new department. When adding a second major in an approved interdisciplinary major combination, this must be noted on the application.

### *Admission of Faculty Members*

No member of the faculty above the rank of instructor may be working toward an advanced degree from CU-Boulder.

### *Credit Policies*

#### *Transfer Credit*

Transfer credits from accredited institutions are accepted by CU-Boulder only after approval by the department chair/program director and the dean of the Graduate School, and under conditions outlined below. Transfer credit is defined as any credit earned at another accredited institution, credits earned on another campus of the CU system, or credits earned as a non-degree student within the CU system. Students seeking a degree from CU-Boulder must complete the majority of their course work while enrolled as degree-seeking students.

The following rules apply to transferring credit to CU-Boulder graduate programs:

1. The maximum amount of work that may be transferred to CU-Boulder depends upon the graduate degree sought (individual departments may have more restrictive limits).

<i>Degree</i>	<i>Semester Hours</i>
MA, ME, MS, MMus, MMusEd, or DMA . . . . .	9
MFA . . . . .	18
PhD or AuD . . . . .	21
AuD students with MA and audiology certification . . . . .	30

2. Work already applied toward a graduate degree received from CU-Boulder or another institution cannot be accepted for transfer toward another graduate degree of the same level at CU-Boulder. In addition, work completed for a doctoral degree may not be applied toward a subsequent master's degree. Extension work completed at another institution cannot be transferred, and correspondence work, except to make up deficiencies, is not recognized.
3. All courses accepted for transfer must be graduate-level courses. A course in which a grade of B- or lower was received will not be accepted for transfer. Transfer course work that is to be applied to a graduate degree at CU-Boulder and was completed more than five years prior to being accepted to the program will be evaluated by the major department as to current relevance and applicability to the degree requirements. At the discretion of the department, a student may be asked to validate transfer credits prior to approval.
4. Credit may not be transferred until the student has completed 6 credits of graduate course work as a regular, degree-seeking student at the Boulder campus with a 3.000 GPA. Transferred credits do not reduce the minimum registration requirement, but may reduce the amount of work to be done in formal courses.
5. Excess undergraduate credits from another institution may not be transferred to the CU-Boulder Graduate School.

### *Graduate Credit for CU-Boulder Seniors*

With the exception of students enrolled in a concurrent bachelor's/master's degree program, seniors at CU-Boulder may earn grad-

uate credit for a limited amount of graduate-level work (up to 9 semester hours), provided such work is completed with a grade of *B* or above in course work at CU-Boulder; comes within the five-year course time limit; has not been applied toward another degree; and is recommended for transfer by the department concerned, and such transfer is approved by the dean of the Graduate School.

### Registration

Registration procedures are sent to new graduate students when they confirm their intent to enroll. Please refer to Registration in the General Information section for further information.

Late registration is held only if enrollment levels have not been reached. Graduate students (including candidates for degrees and students taking only thesis hours) who fail to complete registration and pay fees during regular registration may be charged a late registration fee.

### Concurrent Registration

Boulder campus students unable to obtain courses required for their degree program on the Boulder campus may register for up to two courses or 6 credit hours, whichever is greater, on another University of Colorado campus. The course work must be required for their degree program; they must have their dean's permission; they must be enrolled for at least one course on the Boulder campus; and enrollment levels must not have been reached on the other campus. Contact the Office of the Registrar for additional information.

### Reciprocal Exchange Agreement Program

Reciprocal registration enables University of Colorado graduate students to attend classes at other Colorado institutions, including Colorado School of Mines, Colorado State University, and the University of Northern Colorado. For more information, contact the Office of the Registrar.

### Withdrawal

A graduate student who desires to withdraw from the university should go to Regent Administrative Center 125 for a withdrawal interview. A student who discontinues attendance in a course without officially withdrawing is marked as having failed that course. Except under extreme circumstances, graduate students are not permitted to withdraw after the last day of classes.

## Financial Aid for Graduate Study

The University of Colorado offers several types of financial assistance for graduate students who demonstrate financial need. Students apply for assistance by submitting a financial aid application (the FAFSA) as soon as possible after January 1.

The Colorado Graduate Grant Program is open to graduate students who are Colorado residents. Nonresidents are eligible for student fee grants. To receive assistance, students must be nominated by their departments.

Graduate students may apply for long-term loans through the Stafford Loan (formerly GSL) program or the Perkins Loan program (formerly the National Direct Student Loan) and for part-time jobs through the college work-study program.

### Graduate Part-Time Instructors and Teaching Assistants

Many departments employ graduate students as graduate part-time instructors (GPTIs) or as teaching assistants (TAs). GPTIs

must possess a master's degree or the equivalent and have demonstrated competence in classroom teaching. Teaching assistants are not required to have previous teaching experience. In order to be eligible to be a GPTI or a TA, one must be a fully enrolled graduate student, with a cumulative GPA of at least 3.000. Compensation is based on the percentage of time worked, and includes a tuition waiver and partial insurance benefit.

### Research Assistants

In many departments, research activities provide opportunities for graduate students to work part time as research assistants. All research assistants must maintain a cumulative GPA of at least 3.00 and be full-time regularly enrolled graduate students. Compensation is based on percentage of time worked and includes a tuition waiver and partial insurance benefit.

### Graduate Teacher Program

The Graduate Teacher Program provides professional development opportunities, career consulting, videotape consultation, and teacher training for all graduate students. Because teaching skills prepare graduate students for any career, TAs, GPTIs, and RAs are welcome at GTP workshops on teaching, research, service, and personal and professional development. Workshops are held prior to both fall and spring semesters, throughout the academic year, and during summer session. Topics range from preparing a syllabus, diversity issues, effective approaches to research, academic service, and conflict management to preparing for an academic job interview.

The Graduate Teacher Program offers three certificates: the Graduate Teacher Certificate for graduate students who actually teach; the Professional Development Certificate for Preparing Future Faculty (PDC/PFF); and, in collaboration with Career Services, the Professional Development Certificate for graduate students who are considering nonacademic career paths in business, government, industry (PDC/BGIA), or the arts. Requirements for each are posted on the GTP website at [www.colorado.edu/gtp](http://www.colorado.edu/gtp).

The Lead Graduate Teacher Network offers academic leadership training to 50 graduate students each year. Leads receive the Best Should Teach Silver Award, spend one week in extensive training, and assist departmental faculty with discipline-specific TA training.

International graduate students may benefit from the pre-fall-semester Cultural Intensive, workshops throughout the year, individualized consultation on teaching and career planning, and referrals to ESL services.

The Graduate Teacher Program's Collaborative Preparing Future Faculty Network (COPFFN) provides professional development opportunities for graduate students and faculty. PFF fellows may attend site visits on partner campuses, identify a faculty mentor on a partner campus, work on technology projects, and pursue the PDC/PFF.

The Graduate Teacher Program offers a small number of Provost's Fellowships to graduate students who wish to explore academic librarianship as a career and to those who want to work with a faculty member on course redesign.

### Requirements for Advanced Degrees

A graduate student is responsible for becoming informed about and observing all regulations and procedures required by the graduate program pursued. Ignorance of a rule does not con-

stitute a basis for waiving that rule. Any exceptions to the policies stated in this catalog must be approved by the dean of the Graduate School.

### ***Animal Research and Human Research***

Research involving the use of animals and/or the observation or participation of human subjects must have approval from the Animal Care and Use Committee (IACUC) and/or the Human Research Committee (HRC) prior to the beginning of the project. Forms are available from the office of the vice chancellor for research/dean of the Graduate School or from the website at [www.colorado.edu/VCREsearch/HRC](http://www.colorado.edu/VCREsearch/HRC) or [www.colorado.edu/VCREsearch/AnimalResources](http://www.colorado.edu/VCREsearch/AnimalResources).

### **Graduate Faculty Appointments for Courses and Exams**

All courses, 5000-level or above, completed to fulfill graduate degree requirements must be taught by members of the graduate faculty. In addition, any faculty member serving on a master's or doctoral examination/defense committee must hold a current graduate faculty appointment. Membership on the university faculty does not automatically constitute an appointment to the graduate faculty. Contact your departmental graduate program assistant for questions concerning these appointments.

### **Master's Degrees**

A student enrolled in a master's program must satisfy the degree requirements of both the Graduate School and the major department. The requirements listed below are the minimum standards of the Graduate School; additional requirements are set forth by the major department.

#### ***Minimum Requirements***

The minimum requirement for the master's degree is 30 credit hours. A student may complete a Plan I (thesis) option, or a Plan II (course work) option. At least 24 hours must be completed at the 5000 level or above; these 24 hours may include a minimum of 4, but not more than 6, thesis hours for those students completing a Plan I degree. A maximum of 6 credit hours may be completed at the 3000 or 4000 level at the discretion of the academic department.

Independent study course work cannot exceed 25 percent of the course work required for the master's degree.

#### ***Master's Thesis***

A thesis, which may be research or expository, critical, or creative work, is required of every master's degree candidate under Plan I. Every thesis presented in partial fulfillment of the requirements for an advanced degree must accomplish the following:

- represent the equivalent of 4–6 semester hours of work, and
- comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.

The final grade is withheld until the thesis is completed; if the thesis is not finished at the end of the term in which the student is registered, an in-progress (*IP*) grade is reported.

#### ***Language Requirement***

There is no campuswide foreign language requirement for the master's degree. The decision regarding the foreign language requirement for each graduate degree is the responsibility of the graduate program.

### ***Time Limit***

Master's degree students have four years (six years for students pursuing an ME) from the semester in which they are admitted and begin course work to complete all degree requirements. The phrase "all degree requirements" includes the filing of the thesis with the Graduate School if Plan I is followed. Students who fail to complete the degree in this four-year period may be dismissed from their program with the concurrence of the major advisor and/or appropriate departmental personnel. To continue, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must be endorsed by the student's major advisor and/or other appropriate departmental personnel and may be granted for up to one year.

Students who have not completed the degree within their time limit, and who have received approval for an extension, must have any course work completed more than five years prior to the completion of the degree requirements evaluated by their department for relevance and applicability. At the discretion of the department the student may be required to validate these courses as part of the completion of their degree requirements.

Students who need to leave CU-Boulder for a period of time may apply to the Time Out Program for up to one year. Participation in the Time Out Program does not extend the student's time limit, but may be used as a reason to request an extension.

Students whose registration at CU-Boulder is interrupted by military service may apply to the dean of the Graduate School for an extension.

### ***Minimum Registration Requirement***

Master's degree minimum registration requirements can be met only by full-time registration at CU-Boulder for at least two semesters, at least three summer sessions, or a combination of at least one semester and two summer sessions/part-time semesters.

For purposes of deciding minimum registration credit toward a graduate degree, a student must be registered as a full-time student. One semester of minimum registration credit may be earned for full-time registration during the fall or spring semesters or two summer semesters/part-time semesters.

To be a full-time master's student, a student must carry one of the following course loads: a minimum of 5 credits of graduate course work, 8 credits of combined undergraduate and graduate course work, 12 hours of undergraduate course work, at least 1 master's thesis hour, or at least 1 hour of "Master's Candidate for Degree." Full- and half-time standards may be different for students receiving federal or state financial aid. Students should contact the Office of Financial Aid to see if these standards apply. These different standards are for financial aid purposes only.

### ***Candidacy and Graduation***

To be granted a master's degree, a student must become a candidate for that degree by filing an Application for Admission to Candidacy with the Graduate School no later than the posted graduation deadlines during the semester in which he or she plans to have the degree conferred. Students must meet all posted graduation deadlines in order to receive a degree in any given semester.

### ***Comprehensive-Final Examination***

Each candidate for a master's degree is required to take a comprehensive-final examination/thesis defense after the requirements for the degree have been substantially completed or to present an approved degree plan which meets the requirements



of the field and represents an intellectually coherent graduate education as determined by the major department. The examination/defense may be given near the end of the student's last semester while the candidate is still taking required courses for the degree, provided satisfactory progress is being made in those courses. The approved degree plan must be approved by the department chair, graduate director, and major advisor on the Degree Plan Approval Form. The Degree Plan Approval option is available only in select departments.

The following rules apply to the comprehensive-final examination:

1. A student must be registered on the Boulder campus as a regular degree-seeking student during the semester the examination is passed.
2. Notice of the examination/defense must be filed by the major department in the Graduate School at least two weeks prior to the examination/defense. The examination/defense must be scheduled no later than the posted deadline for the semester in which the degree is to be conferred.
3. The exam is given by a committee of three graduate faculty members appointed by the department with approval of the dean of the Graduate School. The chair of the committee must have a regular or tenured graduate faculty appointment.
4. The examination, which may be oral, written, or both, must cover the thesis (which should be essentially complete), other work completed in courses and seminars in the major field, and all work presented for the degree.
5. A student must have an affirmative vote from the majority of the committee members to pass. A student who fails the comprehensive-final examination may attempt it once more after a period of time determined by the examining committee.

### Doctor of Philosophy, Doctor of Musical Arts, and Doctor of Audiology

The doctor of philosophy (PhD), the doctor of musical arts (DMusA), and the doctor of audiology (AuD) are the highest academic degrees conferred by CU-Boulder. The requirements stated below are minimal requirements for all candidates for the PhD degree; additional conditions are found in department announcements. Additional requirements for the doctor of musical arts are available from the College of Music. Additional requirements for the doctor of audiology are available from the Department of Speech, Language, and Hearing Sciences.

#### Admission

A student admitted to the Graduate School for the master's program must reapply for admission for the doctoral program.

#### Minimum Course Requirement

The minimum requirements for the PhD or DMusA degree are 30 credit hours of course work at the 5000 level or above. Those students pursuing the PhD shall complete a minimum of 30 credit hours of dissertation work beyond the minimum course work requirement. The minimum transfer requirements for the AuD degree are 108 credit hours of course work at the 5000 level or above.

Unless otherwise specified by departmental requirements, all courses taken at the 5000 level or above that were taken for the master's degree at CU-Boulder may be applied toward the PhD degree. Course work taken in pursuit of a doctoral degree cannot be applied toward a subsequent master's degree.

#### Dissertation Credit-Hour Requirement

To complete the requirements for the PhD degree, a student must register for a minimum of 30 dissertation credit hours. Distribution of those hours is as follows:

1. A student may not register for more than 10 dissertation credit hours in any one semester.
2. Not more than 10 dissertation credit hours taken in semesters prior to the semester in which the comprehensive examination is passed may be counted in the 30 dissertation hours required for the degree.
3. Not more than 10 dissertation hours of credit taken the semester in which the comprehensive examination is passed may be included in the 30 dissertation credit hours required for the degree.

#### Minimum Registration Requirement

The minimum registration requirement for doctoral students is six semesters beyond the attainment of an acceptable bachelor's degree. Two semesters of minimum registration credit may be allowed for a master's degree from an accredited institution; however, at least four semesters of minimum registration credit, two of which must be consecutive in one academic year, must be earned for work taken at CU-Boulder.

For purposes of deciding minimum registration credit toward a graduate degree, a student must be registered as a full-time student. One semester of minimum registration credit may be earned for full-time registration during the fall or spring semester or during two summer semesters. Doctoral students who have not passed the comprehensive examination are considered full time during the spring and fall semesters if they are enrolled for at least 5 credit hours of course work at the graduate level, 8 credit hours of combined undergraduate and graduate hours, 12 credit hours of course work at the undergraduate level, or at least 1 doctoral dissertation hour. DMA students who have not passed their comprehensive exam may also be considered full time if they are taking 1 hour of course work numbered 8200-8399 or TMUS 8019. Doctoral students who have passed the comprehensive examination must register for at least 5 doctoral dissertation hours to be considered full-time students. DMA students who have passed their comprehensive examination must register for 1 hour of course work numbered 8200-8399 or TMUS 8029 to be considered full time. Doctor of audiology students are considered full-time students if they are enrolled for at least 5 credit hours of course work at the graduate level, 8 hours of course work of combined undergraduate and graduate hours, or 12 credit hours of course work at the undergraduate level. Full- and half-time standards may be different for students receiving federal or state financial aid. Students should contact the Office of Financial Aid to see if these standards apply. These different standards are for financial aid purposes only.

#### Preliminary Examination

Each department determines for itself (by examination or other means) that students who wish to study for the doctoral degree are qualified. The means by which each department makes this evaluation are specified in departmental requirements. Students who are thus evaluated are notified immediately of the results.

#### Language Requirement

There is no campuswide foreign language requirement for the doctoral degree. The decision regarding the foreign language

requirement for each graduate degree is the responsibility of the graduate program.

### ***Comprehensive Examination***

Before admission to candidacy for the doctoral degree, students must pass a comprehensive examination in the field of concentration and related fields.

The following rules apply to the doctoral comprehensive examination.

1. Students must be registered (*pass/fail* or credit) on the Boulder campus as regular degree-seeking students when they pass the comprehensive examination.
2. Notice of the examination must be filed by the major department with the Graduate School at least two weeks before the examination.
3. The examination is conducted by an examining board appointed by the chair of the major department and approved by the dean of the Graduate School. The board consists of the major advisor and additional members as necessary to a minimum of five. The chair must have a regular or tenured graduate faculty appointment. Successful candidates must receive affirmative votes from a majority of the members of their examination board. A candidate who fails the examination may attempt it once more after a period of time determined by the examination board.
4. The examination, which may be oral, written, or both, tests mastery of a broad field of knowledge, not merely formal course work. The oral part is open to members of the graduate faculty.

### ***Admission to Candidacy***

A student must formally apply for admission to candidacy for the doctoral degree on forms supplied by the Graduate School at least two weeks before attempting the comprehensive examination. Before being admitted to candidacy a student must earn at least three semesters toward the minimum registration requirement, and pass the comprehensive examination.

### ***Continuous Registration Requirement***

A PhD student is required to register continuously for a minimum of 5 dissertation hours in the fall and spring semesters of each year, beginning with the semester following the passing of the comprehensive examination and extending through the semester in which the dissertation is successfully defended (final examination). DMusA students must maintain continuous registration for at least 1 credit of course work numbered 8200–8399 (or TMUS 8029). AuD students must maintain continuous registration for appropriate course work in the fall and spring semesters of each year through the semester in which the final exam is passed.

1. A student not required to maintain full-time status and not using campus facilities may claim off-campus status, which allows registration for 3 rather than the minimum of 5 dissertation credit hours. Off-campus status (3 credits of dissertation hours) is considered part-time. All CU-Boulder considerations for part-time status apply.
2. A student who fails to register continuously for dissertation credit hours after passing the comprehensive examination must retake and pass the comprehensive examination in order to regain status as a student in good standing in the Graduate School. The department may require that the

student validate course work more than five years old. At its discretion, the department may petition the dean of the Graduate School for a time limit for completion of all degree requirements of up to one year after the retaking of the comprehensive exam. The department must petition the dean of the Graduate School to waive the requirement to retake the comprehensive exam.

3. A PhD student must be registered full time for a minimum of 5 dissertation hours during the semester (including summer session) in which the dissertation defense is passed. DMusA students must be registered full time in course work numbered 8200–8399 (or TMUS 8029) during the semester in which the dissertation defense is passed. AuD students must be registered full time for 5 hours of graduate level course work or 8 hours of combined undergraduate and graduate hours during the semester in which the final exam is passed.

### ***Dissertation Requirements***

A PhD student must write a dissertation based upon original investigation, showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research. The subject must be approved by the student's major department.

1. Every dissertation presented in partial fulfillment of the requirements for an advanced degree must represent the equivalent of at least 30 semester hours of work.
2. The student is responsible for notifying the Graduate School of the exact title of the dissertation on or before the posted deadlines during the semester in which the doctoral degree is to be conferred.
3. The dissertation must comply in mechanical features with the specifications for theses and dissertations available in the Graduate School.
4. After the dissertation defense, the student is responsible for submitting the dissertation and signature page on or before the posted deadline during the semester in which the doctoral degree is to be conferred.

The final grade is withheld until the dissertation is completed. In progress (*IP*) grades are assigned during each semester until the defense is successfully completed and the final copy of the dissertation is accepted by the examination committee, at which time the final grade for all dissertation hours is submitted to the Graduate School.

### ***Dissertation Defense/Final Exam***

After the dissertation has been accepted for defense by the student's committee, a final examination on the dissertation and related topics is conducted. For AuD students, a final examination is conducted in place of the dissertation defense.

The following rules apply to the dissertation defense.

1. A student must be registered as a full-time, regular degree-seeking student at CU-Boulder, for a minimum of 5 dissertation hours during the semester in which the final examination is passed. DMusA students must be registered full time in course work numbered 8200–8399 (or TMUS 8029) during the semester in which the dissertation defense is passed. Doctor of audiology students should be registered during the final exam for 5 credit hours of course work at the graduate level or 8 hours of combined undergraduate and graduate hours.

2. Students must notify the Graduate School of their final oral examination at least two weeks before their scheduled examination date.
3. This examination is wholly or partly oral, the oral part being open to anyone.
4. The examination is conducted by a committee appointed by the chair of the major department and approved by the dean of the Graduate School, which consists of at least five persons, one of whom must be from outside the student's major department. Three of the members must be CU-Boulder graduate faculty. The chair and outside member of the committee must have regular or tenured graduate faculty appointments. The other committee members must have either regular or special graduate faculty appointments. The chair and a majority of the committee must be present on the Boulder campus for the examination. More than one dissenting vote disqualifies the candidate in the final examination.
5. A student who fails the examination may attempt it once more after a period of time determined by the examining committee.

### *Time Limit*

Doctoral degree students are expected to complete all degree requirements within six years from the semester in which they are admitted and begin course work in the doctoral program. The phrase "all degree requirements" includes the filing of the dissertation and all accompanying forms with the Graduate School. Students who fail to complete the degree in this six-year period may be dismissed from their program with the concurrence of the major advisor and/or appropriate departmental personnel. To continue, the student must file a petition for an extension of the time limit with the dean of the Graduate School. Such petitions must be endorsed by the student's major advisor and/or other appropriate departmental personnel and may be granted for up to one year. If the dean of the Graduate School and the department chair/program director cannot agree on whether a student should continue, the Graduate School's executive advisory council makes the final decision.

Students who need to leave CU-Boulder for a period of time may apply to the Time Out Program for up to one year. Doctoral students who are required to maintain continuous registration may petition for an exception in order to participate in the Time Out Program for parental leave or other extenuating circumstances. Participation in the Time Out Program does not extend the student's time limit, but may be used as a reason if applying for an extension.

Students whose registration at CU-Boulder is interrupted by military service may apply to the dean of the Graduate School for an extension of time.

### *Graduation*

Students must meet all posted graduation deadlines in order to receive a degree in any given semester.

### *Sequestration of Dissertations*

Dissertations approved by the departments and the Graduate School are released to ProQuest/UMI and kept on file electronically at Norlin Library.

Occasionally, the primary academic advisor, after consultation with the student, may find it necessary to sequester the student's dissertation to protect university rights to intellectual property. The university accepts the obligation to protect poten-

tially publishable creative works and potentially patentable subject matter from premature public disclosure so as to preserve entitlement to patent protection while the technology is being evaluated. This sequestration should take place only when it is absolutely required and only for the minimum time necessary.

With just cause, the student may request that an embargo be placed on the publication/sale of the thesis for a reasonable amount of time. This request is made upon the electronic submission of the document.

## **Interdisciplinary Programs**

### **Atmospheric and Oceanic Sciences**

The interdisciplinary Department of Atmospheric and Oceanic Sciences (ATOC) provides an educational and research environment to examine the dynamical, physical, and chemical processes that occur in the atmosphere and the ocean. A major theme is the establishment of a physical basis for understanding, observing, and modeling climate and global change.

Graduate students, research staff, and faculty work together on a wide range of research topics, such as large-scale dynamics of ocean and atmosphere, air-sea interaction, radiative transfer and remote sensing of ocean and atmosphere, sea ice and its role in climate, cloud-climate interactions, atmospheric chemistry and aerosols, atmospheric technology, extended weather and climate prediction, hydrological processes, and boundary-layer measurement and modeling.

In addition to doctoral and master's degrees, ATOC offers graduate certificates in Atmospheric and Oceanic Sciences (ATOC), and Oceanography. Students majoring in atmospheric and oceanic sciences or other associated departments may wish to consider obtaining one of these certificates to emphasize on their vita that they have specialized in that additional area. Students who are not enrolled in a graduate degree program, but have received a BA or BS degree and meet the course prerequisites may also enroll in courses to obtain the ATOC Certificate or the Oceanography Certificate through the ACCESS program of Continuing Education.

Students who wish to obtain the Graduate Certificate in Atmospheric and Oceanic Sciences (ATOC) must complete a total of four courses from the approved list of courses (below), each with a grade of *B* or better.

### *Courses for the ATOC Certificate*

ASEN 5215/ATOC 5215 Descriptive Physical Oceanography  
 ASEN/ATOC 5235 Introduction to Atmospheric Radiative Transfer and Remote Sensing  
 ASEN 5325 Small-Scale Processes in Geophysical Fluids  
 ASEN 5335 Aerospace Environment  
 ASTR/ATOC/GEOL 5810 Planetary Atmospheres  
 ATOC 5050 Introduction to Atmospheric Dynamics  
 ATOC 5051 Introduction to Physical Oceanography  
 ATOC 5060 Dynamics of the Atmosphere  
 ATOC 5061 Dynamics of the Oceans  
 ATOC/CHEM 5151 Atmospheric Chemistry  
 ATOC/ASTR 5560 Radiative Processes in Planetary Atmospheres  
 ATOC 5600 Physics and Chemistry of Clouds and Aerosols  
 ATOC 5750 Desert Meteorology and Climate  
 ATOC 6100 Predicting Weather and Climate  
 GEOG 5231 Physical Climatology: Field Methods  
 GEOL 5060 Oceanography

Courses that may be taken if they are not in the student's home department include:

ASEN 5051 Fluid Mechanics

ATOC/ASTR 5400 Introduction to Fluid Dynamics  
 ATOC/ASTR 5410 Fluid Instabilities, Waves, and Turbulence  
 ATOC/PHYS 5220 Nonlinear Dynamics  
 CHEM 5161 Analytical Spectroscopy  
 GEOG 5221 Synoptic and Dynamic Climatology  
 GEOG 5331 Mountain Climatology

Students who wish to obtain the Graduate Certificate in Oceanography must complete at least three oceanography core courses (see below) passed with a letter of B or better. In addition, students may take an independent study course to replace one of the core courses.

### *Courses for the Oceanography Certificate*

ATOC 5051 Introduction to Physical Oceanography  
 ATOC 5061 Dynamics of Oceans  
 ASEN/ATOC 5215/4215 Descriptive Physical Oceanography  
 ASEN 5307/4307 Engineering Data Analysis Methods  
 ASTR/ATOC 5400 Introduction to Fluid Dynamics  
 ASTR/ATOC 5410 Fluid Instabilities, Waves, and Turbulence  
 GEOL 5060 Oceanography  
 GEOL 5270 Marine Chemistry and Geochemistry  
 GEOL 5430 Paleoceanography and Paleoclimatology

For additional information about the ATOC Certificate or the Oceanography Certificate, contact the Department of Atmospheric and Oceanic Sciences, University of Colorado at Boulder, 311 UCB, Boulder, CO 80309-0311, **303-492-7167** or [atocasst@colorado.edu](mailto:atocasst@colorado.edu).

### Behavioral Genetics

The Institute for Behavioral Genetics (IBG) offers a training program in behavioral genetics. The goal of the program is to train scientists in the study of genetic contributions to individual differences in behavior. This is accomplished by requiring students to obtain strong training in a primary academic discipline, by providing training in the interdisciplinary field of behavioral genetics, and by providing an atmosphere in which close interactions among scholars with different perspectives may be established.

The program features a core set of courses and continuous research training with one or more IBG faculty members, and furnishes valuable opportunities for interaction among scholars with widely varying academic backgrounds. A student wishing to specialize in behavioral genetics must be regularly enrolled as a graduate student in an academic department of the university.

The training program requires completion of four core courses (Genetics, Molecular and Behavioral Genetics, Statistics, and Scientific Integrity), one course from core quantitative electives (Quantitative Genetics, Biometrical Methods in Behavioral Genetics, and Statistical Genetics), one course from core basic science electives (Bioinformatics and Genomics, Neuropharmacology), and one "Concepts" or "Seminar" course in behavioral genetics. Students also must participate in a weekly journal club and monthly colloquia series.

Each trainee works as a teaching assistant for one semester in a course relevant to his or her professional specialty. An IBG trainee's doctoral dissertation research must be conducted on a topic directly relevant to animal or human behavioral genetics.

A student in the interdisciplinary certificate program must have an IBG faculty member as an advisor and an advisory committee composed of faculty from both IBG and the academic department. The advisory committee evaluates the student's progress and may impose additional requirements.

Information about the IBG interdisciplinary certificate program may be obtained at [www.colorado.edu/ibg/education\\_and\\_training/affiliated.html](http://www.colorado.edu/ibg/education_and_training/affiliated.html) or by contacting the Institute for Behavioral

Genetics, University of Colorado at Boulder, 447 UCB, Boulder, CO 80309-0447; **303-492-7362**; fax **303-492-8063**.

### Biotechnology

The graduate certificate program in biotechnology provides integrated, interdisciplinary training that encompasses both modern biological sciences and biochemical engineering. The goal of the program is to help students acquire the skills and credentials to undertake crossdisciplinary research in modern industrial, academic, and government biotechnology research laboratories and the perspective to serve as leaders in the advancement of beneficial applications of modern biotechnology.

The graduate biotechnology program is offered cooperatively by the Departments of Chemical and Biological Engineering, Chemistry and Biochemistry, and Molecular, Cellular, and Developmental Biology. The program awards a certificate, not a separate degree; each student enrolls in a participating department and meets the degree requirements for that department.

A student must take 6 semester credit hours of graduate biotechnology courses, including CHEN 5830 Introduction to Modern Biotechnology and CHEN 5831 Biotechnology Case Studies. For the remaining credits, bioscience graduate students choose from bioengineering courses, and bioengineering students choose from bioscience courses.

During their first year, students take laboratory rotations in participating faculty laboratories. At least one laboratory rotation must be outside the student's home department. Students receive up to 7 semester credit hours of independent study or laboratory-methods credit for these rotations.

All students are expected to undertake internships with local biotechnology companies. These internships usually take place during the summer after the first year of graduate study.

For more information on the biotechnology certificate program, contact Professor Ryan Gill, Department of Chemical and Biological Engineering, University of Colorado at Boulder, 424 UCB, Boulder, CO 80309-0424; **303-492-2627**.

### Chemical Physics

The interdepartmental doctoral program in chemical physics prepares students for research in such interdisciplinary fields as atomic and molecular radiative processes, spectroscopy, laser chemistry and physics, atmospheric chemistry, molecular quantum mechanics, statistical mechanics, kinetics, chemistry and physics of the surface and condensed phase, semiconductors, and nanoscale processes.

Students wishing to pursue the doctoral degree in chemical physics should apply for admission to either the Department of Chemistry and Biochemistry or the Department of Physics.

Entering students take a qualifying examination in the area of their undergraduate major. The comprehensive examination tests their knowledge of both chemistry and physics. Certain requirements associated with the regular doctoral programs in the participating departments will be replaced by requirements in the complementary field; each student's program of course work and research will be individually planned according to the student's special needs.

The program is administered by an interdepartmental committee. For further information, contact the graduate program assistant in either the Department of Chemistry and Biochemistry or the Department of Physics.

## Cognitive Science

The cognitive science academic program includes a combined PhD degree between cognitive science and a core discipline, as well as a combined PhD plan of study tailored for students interested in cognitive neuroscience. In addition, there are two certificates at the graduate level of study. The first of these is a certificate in general issues in cognitive science that can be tailored to the individual student's area of interest. The cognitive science curriculum for this certificate is designed to provide broad as well as in-depth training in the cognitive sciences. The second graduate certificate is in Human Language Technology (HLT) and is specifically designed to provide interested graduate students with a rich and broad background in computational tools for human language processing. These programs are administered by the Institute of Cognitive Science (ICS) of the University of Colorado at Boulder. Graduate students in cognitive science are admitted to graduate programs in participating departments that have cognitive science faculty and must meet the requirements for admission and degree completion in their home department.

Students wishing to attain a degree or certificate in cognitive science must formally apply to the director of Academic Programs of ICS. To be admitted they must be a student affiliate of ICS, which requires being a graduate student in good standing in a member department, and they must be sponsored by an ICS faculty member. Students who enter the Graduate School without a master's degree may be admitted to the program upon completion of their first year of study; students with a master's degree may be admitted during their first year.

The degree and certificate programs in cognitive science require students to demonstrate acceptable performance in interdisciplinary course work and courses outside their home department. The courses must be offered by the departments of computer science; education; linguistics; philosophy; psychology; speech/language/hearing sciences; architecture, planning, and design; or another department in which there is an ICS faculty member. Details about requirements for the degree and certificate programs can be obtained through the Director of Academic Programs for ICS, or by contacting the ICS main office.

For further information contact the University of Colorado at Boulder, Institute of Cognitive Science, 344 UCB, Boulder CO 80309-0344; 303-492-5063.

## Distance Learning and Professional Development Programs

The Center for Advanced Engineering and Technology Education (CAETE) is the distance learning and professional studies arm of the College of Engineering and Applied Science. CAETE provides convenient and flexible education for working professionals. Courses are delivered in the campus classroom and via the Internet to students across the country and abroad.

Academic course sequences may lead to a graduate certificate or master's degree in the following areas:

### Certificates

- Computer and Network Security
- Embedded Systems (classroom only)
- Engineering Management
- Engineering Entrepreneurship
- Leadership and Ethical Decision Making
- Managing Applied Research in Technology
- Managing Research and Development
- Performance Excellence in Technology Management

- Power Electronics
- Project Management
- Quality Systems for Product and Process Engineering
- Six Sigma
- Software Engineering
- Technology Ventures and Product Management
- Wireless Networks and Technologies

### Degrees

- Aerospace Engineering, ME and MS
- Computer Science, ME
- Electrical and Computer Engineering, ME and MS
- Engineering Management, ME
- Telecommunications, ME and MS

CAETE also provides access to over 100 pre-recorded courses via their virtual library. These courses are available for academic course work, or purchase by companies for in-house training.

For additional information refer to the engineering and applied science section or contact CAETE at 303-492-6331, [caete@colorado.edu](mailto:caete@colorado.edu), or [caete.colorado.edu](http://caete.colorado.edu).

## Engineering Management Program

The Engineering Management Program at the College of Engineering and Applied Science offers a master of engineering degree in engineering management. The ME degree is designed for professionals who seek to develop in-depth managerial and entrepreneurial skills specific to engineering and the applied sciences. The curriculum provides in-depth engineering and management knowledge. Courses may be taken on campus or through our distance learning program.

The master of engineering degree in engineering management consists of 30 credit hours, six core courses, and four elective courses. The electives offer competency in the following areas:

- Engineering Entrepreneurship
- Engineering Management
- Leadership
- Management of Research and Development
- Managing Applied Research
- Performance Excellence in Technology Management
- Project Management
- Quality Systems
- Six Sigma (Green Belt, Black Belt, Master Black Belt)
- Software Management

Graduate certificates are also available in many of the above core competency areas. Credits accrued toward a certificate can be applied toward a master's degree.

Visit [emp.colorado.edu](http://emp.colorado.edu) for more information.

## Environment, Policy, and Society

In order to understand contemporary environmental issues, today's scholars must transcend historical academic disciplinary boundaries. Indeed, complex issues related to energy, climate change, species preservation, and air and water quality are best addressed by valuing insights from multiple perspectives. The Graduate Certificate Program in Environment, Policy, and Society allows students the opportunity to engage in interdisciplinary exploration of these contemporary environmental problems by drawing from courses across a wide range of social science disciplines. The certificate curriculum incorporates courses from many departments in the College of Arts and Sciences, including anthropology, biology, economics, geography, philosophy, political science, psychology, and sociology. In addition, pertinent courses are available in the College of Architecture and Planning, the Leeds School of Business, the College of Engi-

neering and Applied Science, the School of Journalism and Mass Communication, and the School of Law. Tracks are available in:

- Environment and Society
- Environmental Policy
- Energy and Society
- Water and Society

Students will be expected to complete the interdisciplinary cornerstone course, an integrative capstone course, and 9–12 hours from the menu of courses available for each track.

Admission to the certificate program is open to students in any regular graduate degree program at the University of Colorado. A limited number of individuals already holding master's or doctoral degrees from other institutions may be admitted, provided they meet the normal admission requirements of a participating department.

To receive the certificate, students must complete 18 hours of approved course work, including 6 hours of cornerstone/capstone seminars. At least 12 of the 18 hours must be in courses outside the department in which the student is currently enrolled. The certificate is awarded to recognize the additional course work beyond that required for the student's regular degree program. Hence, transfer credit for courses taken elsewhere may not be counted toward certificate requirements.

Questions about the certificate program in environment, policy, and society should be directed to the Environmental Studies Program, University of Colorado at Boulder, 397 UCB, Boulder, CO 80309-0397; [envsgrad@colorado.edu](mailto:envsgrad@colorado.edu).

## Environmental Studies

The interdisciplinary graduate degrees in environmental studies offer opportunities for education and research at the professional level to address the complex environmental issues facing Colorado, the Rocky Mountain west, and the global community. Students may pursue studies toward the master of science (MS) or doctor of philosophy (PhD) degrees, as well as dual degrees with Leeds School of Business (MS/MBA) and the Law School (MS or PhD/JD).

Graduate students, faculty, and research staff work together on research topics such as: climate and atmospheric chemistry, water sciences, energy, environmental policy, sustainability, environmental social sciences, and biogeoscience.

Skills acquired through participation in the program will allow graduates to devise strategies for the use of natural resources that are sustainable and comply with environmental regulations; apply the environmental sciences to commercial and government work in environmental remediation; analyze environmental resources for private or public planning purposes; provide an interface between management and engineering/science in industry and government; propose and implement cost-effective solutions to environmental problems; and develop regulatory laws that have a sound physical basis.

Additional information about graduate degrees in environmental studies may be obtained by contacting: the Graduate Program Assistant, Environmental Studies Program, University of Colorado at Boulder, 397 UCB, Boulder, CO 80309-0397; **303-735-1043**; or [envsgrad@colorado.edu](mailto:envsgrad@colorado.edu).

## Geophysics

The interdisciplinary doctoral program in geophysics encourages students with a variety of undergraduate backgrounds to pursue graduate study in the physics of the Earth, with special emphasis on the interior of the planet. Students specialize in one of the sub-

fields of geophysics while gaining a broad, general background in the discipline and in-depth education in the relevant aspects of the parent fields of geology, physics, and engineering.

Students enter the program by applying for admission to one of the following departments: aerospace engineering sciences; astrophysical and planetary sciences; civil, environmental, and architectural engineering; electrical and computer engineering; geological sciences; mechanical engineering; or physics. Upon satisfactory performance on the doctoral preliminary examination given by the home department, the student may formally apply for admission to the geophysics doctoral program.

The program is administered by the geophysics graduate program committee, which includes representatives from each of the participating departments. The comprehensive examination and the dissertation defense are directed by this committee, with a faculty member of the home department normally chairing these procedures.

For further information, see [www.colorado.edu/geophysics](http://www.colorado.edu/geophysics), or call or write the Director, Geophysics Program, Department of Physics, University of Colorado at Boulder, 390 UCB, Boulder, CO 80309-0390; **303-735-5095**.

## Human Language Technology

The recent growth of the World Wide Web and the vast improvements in computing power of the last decade have led to a greater need for education and research in human language technology. This interdisciplinary field includes key technological and scientific areas such as automatic speech recognition and synthesis, natural language understanding and generation conversational agents, augmentative and alternative communication, audio and text-based information retrieval, and grammar and spelling aids.

The curriculum for the certificate includes five core courses, consisting of a computer programming foundation course plus four courses in human language technologies (e.g., natural language processing, morphology and syntax, speech processing, and recognition). At least two of the language technologies courses must be outside the student's home department.

Students are required to major in computer science, electrical and computer engineering, linguistics, or speech, language, and hearing sciences. The program is available to master's or PhD students at CU-Boulder, including students in concurrent bachelor's/master's programs. For further information see [www.colorado.edu/linguistics/programs/grad](http://www.colorado.edu/linguistics/programs/grad), or Institute of Cognitive Science at [ics.colorado.edu](http://ics.colorado.edu).

## Hydrologic Sciences

The CU-Boulder Hydrologic Sciences Graduate Program focuses on quantitative studies of water in the environment including its role in geologic and biogeochemical processes, ecosystem functions, and global elemental cycling. The program is interdisciplinary and interdepartmental. It is intended for science and engineering graduate students, both currently enrolled and prospective. It allows students to obtain recognition for their accomplishments in hydrologic sciences and demonstrates the quantitative multi-disciplinary education desired by many prospective employers.

Students can choose to enroll for a full Hydrologic Sciences PhD degree or obtain a hydrologic sciences graduate certificate while concurrently obtaining a master's or doctoral degree in an associated academic department. Prerequisites and course requirements are identical for the PhD degree and graduate certificate.

Students are members of the broader CU-Boulder Geophysical Sciences Program, which has two specialization options: solid-Earth geophysics and hydrologic sciences. All hydrologic sciences students are admitted through one of the participating departments: civil, environmental, and architectural engineering; ecology and evolutionary biology; environmental studies; geography; or geological sciences.

Students may apply for admission either concurrently with their application to one of the participating departments or after admission by a department. The program is designed to encourage students with a variety of undergraduate backgrounds to enter the field. Nevertheless, all students in the program must have a substantial background in math and physics, including fluid dynamics. At the time of acceptance, the student will be informed of any undergraduate deficiencies that they will need to address within the first year in the program.

Most hydrologic sciences students conduct research with participating departments, research institutes, and centers (i.e., INSTAAR and CIRES), or partner government agency labs in the Boulder area (i.e., USGS and NOAA). Primary supervision of the student's research may be provided by any faculty member approved by the department.

Additional information is available at [hydrosciences.colorado.edu/about/index.php](http://hydrosciences.colorado.edu/about/index.php), or by contacting the graduate assistant for hydrologic sciences, Benson Earth Sciences 246 A, 397 UCB, University of Colorado, Boulder, CO 80309-0397, **303-735-1043**, [hydrogrd@colorado.edu](mailto:hydrogrd@colorado.edu).

## Molecular Biophysics

The goal of the molecular biophysics certificate program is to introduce graduate students to the field of biophysics, its methodologies, and the state-of-the-art biophysical research efforts being carried out in diverse laboratories and departments on the CU-Boulder campus. The program creates interdepartmental connections that provide the breadth of training needed to develop biophysical scholars.

Students must be admitted through the regular admissions process to a PhD program in one of the following departments: chemical engineering, chemistry and biochemistry, ecology and evolutionary biology, or physics. They must satisfy all of their home department's requirements to receive a PhD.

The first requirement of the molecular biophysics certificate is participation in one to three laboratory rotations outside the thesis lab, which provide experience with a range of biophysical methods.

The second component of the program is the completion of two courses chosen from a list of approved courses. Currently this list includes 15 courses in areas ranging from theoretical physics to molecular and cellular biophysics.

Students are expected to take part in a seminar series, which introduces internationally renowned speakers and their research. They also are required to participate in supergroup meetings and symposia, which provide forums for them to present their own research in front of their colleagues and advisory committee.

## Museum and Field Studies

The interdisciplinary museum and field studies program leading to a master of science degree is administered by the University Museum, in conjunction with the departments of anthropology; history; art history; ecology and evolutionary biology; and geological sciences; as well as other departments. The program pro-

vides a strong background in a chosen field as well as theoretical and practical grounding in museology.

Internships are offered at a variety of museums in the region, including natural history, history, and art museums. Students completing the MS are trained as collection managers, curatorial assistants, registrars, museum educators, exhibit technicians, and administrators.

## Program Tracks

Two tracks are available: a collection/field track and an administrative/public track.

The **collection/field track** offers training for students interested in the curatorial and research aspects of museum work, such as floristic or faunistic studies of the past and present, material culture of the past and present, and biological inventory. The curriculum gives students academic training as well as experience in all areas of museum work. Field experience is offered through the curatorial and field practica.

The **administrative/public track** offers education for students interested in the public aspects of the museum such as program development and evaluation, exhibition planning and design, education, and the organization and management of museums. The curriculum offers both academic training in a discipline and hands-on experience with all aspects of the public museum.

## Admission

Students must meet all university requirements for admission to graduate school and have a baccalaureate degree and at least a *B* (3.00) grade-point average in previous academic work. The baccalaureate degree should be in anthropology, biology, geology, geography, history (including archival studies), classics, fine arts, or education, although other majors will be considered. Acceptance to the program is decided by the admissions committee of the University Museum in consultation with the student's department. The student must be accepted by an advisor in his or her discipline.

## Requirements

The degree in museum and field studies is a two-year program requiring a total of 32 credit hours. Students may choose either the thesis or nonthesis plan. Depending on the track and plan, students complete from 9 to 15 credit hours in a department and from 13 to 22 credit hours in museology courses. One hundred fifty work hours of internship are required. The thesis plan requires the completion and successful defense of a thesis; the nonthesis plan requires the completion of a paper or a project.

For current course information, consult the Museum section under the College of Arts and Sciences. For new course or admissions information, write the Museum and Field Studies Program, University Museum, University of Colorado at Boulder, 265 UCB, Boulder, CO 80309-0265; call **303-492-5437**; e-mail [mfsinfo@colorado.edu](mailto:mfsinfo@colorado.edu); or visit [cumuseum.colorado.edu/MFS](http://cumuseum.colorado.edu/MFS).

## Neuroscience and Behavior

The graduate certificate program in neuroscience and behavior focuses on understanding the nervous system and its relationship to disease and behavior. This understanding encompasses the molecular, cellular, and behavioral aspects of neuroscience.

Students come from such graduate programs as ecology and evolutionary biology; behavioral genetics; molecular, cellular, and developmental biology; psychology; and integrative physiology. They receive a PhD in their department and a certificate in neuroscience.

The neuroscience core curriculum includes courses in the following areas: neuroscience methods laboratory, neuroanatomy (PSYC 5263), neurochemistry or neuropharmacology (e.g., PSYC 5062, PSYC 5132), neurophysiology or systems neuroscience (e.g., PSYC 5042, EPOB 5190), behavioral neuroscience or animal behavior (e.g., EPOB 5240, KINE 5610, PSYC—to be developed), molecular neuroscience or molecular genetics or developmental neuroscience (e.g., PSYC 5232, EPOB 5200, MCDB—to be developed).

Students are required to attend a weekly journal club or discussion group and neuroscience colloquia.

### Neuroscience, Interdepartmental PhD Program in

The graduate PhD program in neuroscience is an interdepartmental program currently consisting of eight tracks to a PhD: behavioral genetics (psychology); behavioral neuroscience (psychology); clinical neuroscience (psychology), cognitive neuroscience (psychology); social neuroscience (psychology); integrative physiological neuroscience (integrative physiology); molecular, cellular, and developmental neuroscience (MCD-biology); or speech, language, and hearing neurosciences (SLHS). Students apply for admission to one of the participating departments and their admission to CU-Boulder and financial support are determined by that department. Once in residence, students enter the neuroscience PhD program while still maintaining their “home” in the department to which they were admitted. They receive a PhD that lists both their home department and neuroscience.

The neuroscience curriculum includes a year-long intensive core course, graduate seminar courses linked to an invited speaker series, and wide-ranging neurosciences courses offered by many departments and institutes across campus.

Potential applicants are encouraged to visit the neuroscience website, which provides detailed information on the program, application process, courses, faculty, and current trainees: [www.colorado.edu/neuroscienceprogram](http://www.colorado.edu/neuroscienceprogram).

### Optical Science and Engineering Program (OSEP)

The graduate certificate program in optical science and engineering offers interdisciplinary training in optics. Participating academic departments include physics, chemistry and biochemistry, and electrical and computer engineering, along with JILA, a joint institute between CU and NIST. To help students gain employment in either academia or industry, the program provides optics course work, broad research training, academic rotations, and a connection to the business community through the Industrial Advisory Board.

Course work for the certificate comprises an Optics Laboratory class as well as three other full-semester optics courses such as:

- Introduction to Optics
- Fundamentals of Optics and Lasers
- Physical Optics
- Optoelectronic Devices
- Advanced Molecular Spectroscopy.

Students also are required to perform an industrial internship, participate in an interdisciplinary Optics Seminar, and take non-credit mini-courses in technical communication, machine shop, electronics, and ethics. For information, contact Professor Dana Anderson, University of Colorado at Boulder, 440 UCB, Boulder, CO 80309-0440; 303-492-5202; or e-mail [dana@jila.colorado.edu](mailto:dana@jila.colorado.edu).

### Population Studies

The graduate certificate program in population studies, offered through the Population Program of the Institute of Behavioral Science, recognizes master's and doctoral degree students for interdisciplinary work in demography. The population program, which is international in scope and has an applied and policy-oriented focus, fosters research on population trends and patterns and provides training in population analysis. Students who are earning graduate degrees through the Departments of Economics, Geography, or Sociology and are interested in majoring in demography are eligible to petition for admission to the program.

The population program emphasizes research training through direct faculty/student interaction and involvement in research projects. Students are required to take three core courses: ECON 8666 Economic Demography; GEOG 6732 Formal Population Geography; and SOCY 6012 Population Issues, Problems, and Policies. Students are granted a certificate on the basis of the three core courses, their applied research, and their thesis or dissertation.

Questions about the certificate program in population studies should be directed to the Population Program, Institute of Behavioral Science, University of Colorado at Boulder, 484 UCB, Boulder, CO 80309-0484; 303-492-7986; [www.colorado.edu/ibs/pop](http://www.colorado.edu/ibs/pop); [cupc@colorado.edu](mailto:cupc@colorado.edu).

### Remote Sensing

Remote sensing (satellite and ground based) is increasingly being used as a technique to probe the Earth's atmosphere, ocean, and land surfaces. Probing of other planets is accomplished largely by satellite remote sensing. Given national priorities in such areas as climate and global change, the interest in remote sensing will only increase with time.

Remote sensing is a relatively new academic subject, with few universities having any sort of an organized curriculum. The purpose of formalizing the CU remote sensing curriculum is to coordinate curricula across campus so that a coherent curriculum in remote sensing can be provided to complement and supplement the students' regular degree program. An additional purpose is to encourage multidisciplinary education of the students in the area of remote sensing.

Graduate students, research staff, and faculty work on a wide variety of topics, ranging from the theory of remote sensing to its application. These applications include: use of satellite remote sensing to determine ocean surface temperature and heat fluxes, use of surface radar to improve the determination of clouds and precipitation from satellites; determination of surface biological characteristics and productivity from satellites; mapping of surface landform and topographical features; searching for locations of buried artifacts; use of surface radar to determine upper atmosphere wind motions; and aircraft remote sensing to assess the validity of satellite retrieval algorithms of surface and atmospheric characteristics.

A Certificate in Remote Sensing will be awarded based on a written request by the student to the remote sensing graduate chairman, provided that the following requirements have been met:

All students must take at least three remote sensing core courses (passed with a grade *B* or better) and register for ATOC 7500/ASEN 6310, Remote Sensing seminar, for at least one semester. This class is given once each year. Most remote sensing core courses are offered once each year.



The remote sensing graduate core courses are:  
 ATOC 7500/ASEN 6310 Remote Sensing Seminar  
 ASEN/ATOC 5235 Remote Sensing of the Atmosphere and Ocean  
 ASEN 5337 Remote Sensing Data Analysis  
 ASEN 5168 Remote Sensing Instrumentation  
 ASEN 5245/ECEN 5254 Radar and Remote Sensing  
 ECEN 5274 Radar Science and Techniques  
 GEOL/GEOG 5093 Remote Sensing of the Environment  
 GEOL 5440/GEOG 6443 Remote Sensing Field Methods  
 GEOL 6340 Remote Sensing of Planetary Surfaces

Letters to the Remote Sensing Graduate Committee should be sent to the remote sensing graduate chairman, Professor Bill Emery, University of Colorado at Boulder, 431 UCB, Boulder, CO 80309-0431; phone 303-492-8591; or e-mail [emery@colorado.edu](mailto:emery@colorado.edu).

## Science and Technology Policy

The graduate certificate in science and technology policy is a rigorous educational program to prepare students pursuing graduate degrees for careers at the interface of science, technology, and decision making. Past recipients of the certificate have gone on to positions in the U.S. Congress, academia, NOAA, and other policy relevant positions.

Students come from such graduate programs as aerospace engineering, atmospheric and oceanic sciences, biological sciences, chemistry, civil engineering, environmental studies, geography, journalism, and mechanical engineering. Students enrolled receive either a master's or doctoral degree in their department and a certificate in science and technology policy.

Each year, the certificate program will begin with a capped enrollment of 18 students per cohort. These 18 students will take three required courses (Science and Technology Policy Certificate, or STPC):

STPC 6000/ENVS 5100 Science and Technology Policy  
 STPC 6010/ENVS 5110 Science, Technology, and Society Studies  
 STPC 6020/ENVS 5120 Quantitative Methods of Policy Analysis

In addition to the above three required courses students are also required to take three additional courses from a list of approved electives. For a list of all required courses and electives see [sciencepolicy.colorado.edu/stcert/curriculum/courses.html](http://sciencepolicy.colorado.edu/stcert/curriculum/courses.html). Successful completion of the certificate program requires the completion of 18 hours of course work (or course work plus internship credit).

For more information, visit [sciencepolicy.colorado.edu/stcert](http://sciencepolicy.colorado.edu/stcert).

## Telecommunications

Modern telecommunication encompasses the Internet, wireless and mobile networks, and the telephone network. These networks drive economic growth and have an important role in society. The graduate Interdisciplinary Telecommunications Program prepares students for a professional career in telecommunications through a study of the underlying technologies, the business and economic environment in which they operate, and the legal and policy framework that shapes the industry. Students are given the tools for successful careers today and the foundation to be future technology leaders.

### *Masters Degree Programs*

Students may pursue studies toward the master of science degree (MS) or the master of engineering degree (ME). The Interdisciplinary Telecommunications Program also offers several concurrent degrees that combine the MS in telecommunications with a: BS in operations and information management; masters of business administration; ME in engineering management; or

juris doctor. All degrees include a strong laboratory component, interaction with industry leaders, participation in nationally recognized policy debates, and an emphasis on developing communication skills. Degree seeking and non-degree students may pursue certificates in computer and network security; and wireless networks and technologies.

Students are required to have an undergraduate degree from a regionally accredited university and must include current GRE and/or GMAT scores with their applications. Applications are invited from graduates who have good academic records and professionals with work experience/training in telecommunications. For more information about the telecommunications program go to [telecom.colorado.edu](http://telecom.colorado.edu). The MS in telecommunications may be completed either on campus or through the Center for Advanced Engineering and Technology Education (CAETE) Distance Learning Program. For more information about the Distance Learning Program, go to [caete.colorado.edu](http://caete.colorado.edu).

## Women and Gender Studies

The graduate certificate in women and gender studies offers a graduate-level education in the systematic approach to the study of gender from an interdisciplinary perspective. It provides an intellectual context in which students study feminist theory and methodology at an advanced level. At the same time, the certificate program bridges the gap between discipline-centered studies and the interdisciplinary foundations of women's studies, thereby enhancing the student's ability to conduct gender-based research.

Students wishing to take part in the women's studies certificate program must be enrolled in a master's or doctoral degree program at CU-Boulder and have completed at least 6 hours of graduate study.

The certificate program has two components: course work based in the interdisciplinary women's studies curriculum, and course work drawing upon gender studies in other disciplines. The program's curriculum consists of two required courses:

WMST 5010 Feminist Methodologies  
 WMST 5090 Feminist Theories

Two elective courses on gender-related issues from different departments outside the student's discipline are also required.

Students in the program work with an advisor to develop an elective course plan and research emphasis that reflects a coherent and interdisciplinary plan. Departments in which electives may be taken include anthropology, economics, English, fine arts, history, journalism, law, music, philosophy, and sociology. Contact Women and Gender Studies at [wgst@colorado.edu](mailto:wgst@colorado.edu) for information about other departments that may qualify.

## Professional Certificate Programs

### Embedded Systems

In the last few years, commercially available digital systems (microprocessors, microcontrollers, memory chips, interface systems, and systems that handle image, voice, music, and other types of signals) have experienced explosive growth in the electronics industry. These devices are increasingly powerful, cheap, and flexible as design components.

The certificate in embedded systems, which is offered by the Department of Electrical, Computer, and Energy Engineering and the Center for Advanced Engineering and Technology Education, with support of the Division of Continuing Education, offers students the hardware and software knowledge and skills

needed to design and implement these systems. The curriculum consists of two core courses and one elective course from an approved list. The two core courses are:

- ECEN 4613/5613 Embedded System Design
- ECEN 4623/5623 Real-Time Embedded Systems

The list of approved electives is periodically updated and currently includes:

- ECEN 4573 ECE Capstone
- ECEN 4543/5543 Software Engineering of Stand-Alone Programs
- ECEN 4633/5633 Hybrid Embedded Systems

Applicants for the certificate program must have been or currently be enrolled for a baccalaureate degree from an accredited institution and have satisfied the prerequisites for each course through course work or work experience. They need not be enrolled in a degree-granting program at CU-Boulder. A grade of B- or better is required for each course applied toward the certificate. For more information, visit [ecee.colorado.edu/academics/cert\\_programs/overview.html](http://ecee.colorado.edu/academics/cert_programs/overview.html).

## Engineering Management Program

### Engineering Entrepreneurship (12 credit hours)

This certificate is offered in partnership with the nationally renowned Deming Center for Entrepreneurship in Colorado. It provides the student with the essential knowledge, understanding, and skills to successfully practice entrepreneurship in a start-up venture or within a larger corporation (intrapreneurship). The focus is on how much to launch, lead, and manage a viable business starting with concept validation to commercialization and business formation. The program culminates with the development of a business plan for a project that the student chooses and then pitches to business community leaders and venture capitalists.

- EMEN 5051 Technology Ventures and Leadership
- EMEN 5710 Business Simulation
- EMEN 5090 High Technology Marketing
- EMEN 5825 Business Plan Development

### Engineering Management (12 credit hours)

The certificate provides a broad-based view of the key principles and concepts that are important for technical managers, including finance and accounting, leadership and management, quality management, and project management. The certificate requires four courses selected from the five core courses in the Engineering Management graduate curriculum.

- EMEN 5010 Introduction to Engineering Management
- EMEN 5020 Finance and Accounting for Engineers
- EMEN 5030 Project Management Systems
- EMEN 5040 Quality, Strategy, and Value Creation
- EMEN 5050 Leadership

### Leadership and Ethical Decision-making (9 credit hours)

Engineers and scientists can think systemically, visualize complex technical and human interactions, and resolve conflicting viewpoints. This certificate develops technical professionals so that they may apply these talents more broadly and play a leadership role in their organizations. Students develop the knowledge and skills necessary to lead and learn the ethical decision-making processes they need to make real-world decisions. There are two core courses:

- EMEN 5050 Leadership
- EMEN 5080 Ethical Decision-making

The third course is chosen by the student from the following list. Each of these courses provides grounding and context for the different situations in which technical professionals work.

- EMEN 5010 Introduction to Engineering Management
- EMEN 5040 Quality, Strategy, and Value Creation
- EMEN 5825 Entrepreneurial Business Plan Preparation

### Managing Applied Research in Technology (12 credit hours)

This certificate provides engineering managers with the tools to effectively and efficiently manage applied research in areas such as sustaining engineering, customer and supplier evaluation, quality improvement and problem solving, new process and facility start-up, the design of complex and interdependent systems, and cost reduction analysis. Methods taught include advanced experimental design, sample sizes, use of powerful parametric and nonparametric analyses, and data mining.

- EMEN 5042 Methods for Quality Improvement
- EMEN 5610 Advanced Statistical Methods for Engineering Research
- EMEN 5620 Data Mining and Screening Experiments for Engineering Research
- EMEN 5900 Research Methods

### Managing Research and Development (9 credit hours)

The formal name for innovation within a corporate setting is R&D. Innovation has become essential to every company's survival and well-being. Innovation takes many forms including product, process, and business model innovation. Individuals who understand and can manage innovation and creativity have great career opportunities. This certificate provides proven concepts and tools for managing the innovation process of strategy formation, portfolio development, and project execution in both hardware and software environments.

- EMEN 5030 Project Management Systems
- EMEN 5300 Management of Research and Development (R&D)
- EMEN 5400 Principles of Product Management or EMEN 5430 Software Product Management

### Performance Excellence in Technology Management (12 credit hours)

This certificate provides a cutting-edge model for Business Performance Excellence (BPE). BPE is a facilitating system, enabling companies to successfully execute their improvement program efforts, such as Six Sigma, to increase profitability. In addition to cost reduction, the application of quality principles and allocated cost accounting enables identification of revenue generating "sweet spots" for profit optimization.

- EMEN 5040 Quality, Strategy, and Value Creation
- EMEN 5041 Advanced Topics in Value Creation
- EMEN 5042 Methods for Quality Improvement
- EMEN 5050 Leadership

### Project Management Professional Certification (9 credit hours)

This certificate is designed around the Project Management Body of Knowledge (PMBOK) and builds a foundation for the preparation of PMP certification. This certificate can be completed in one calendar year.

- EMEN 5030 Project Management Systems
- EMEN 5032 Advanced Topics in Project Management
- EMEN 6830 Project Management Capstone or EMEN 5050 Leadership and Management

### Quality Systems for Product and Process Engineering (12 credit hours)

This certificate provides engineering managers with the technical expertise needed to manage initiatives in quality improvement, problem-solving, and reliability improvement. Upon completion, students are certified as Green Belts for Six Sigma programs.

- EMEN 5040 Quality, Strategy, and Value Creation
- EMEN 5042 Methods for Quality Improvement
- EMEN 5043 Advanced Topics in Quality Systems/Engineering
- EMEN 5900 Research Methods

### Technology Ventures and Product Management (12 credit hours)

Technology venture management and product development is key to the sustained success of any high-technology business in today's intensely competitive and global marketplace. This certificate is designed for the engineer in any size company (Fortune 500 to start-up) who wants to embrace the challenge of managing the strategy and implementation of new technology product development. Using case studies and realistic business emulation exercises, the student will gain an understanding and

practice the skills required to evaluate technology, consider its viability as a product, and manage the development effort required to deliver a product that provides an exceptional customer experience.

EMEN 5051 Technology Ventures and Leadership  
 EMEN 5090 High Technology Marketing  
 EMEN 5710 Business Simulation  
 EMEN 5400 Principles of Product Management

## Museology

The professional certificate in museology provides professional museum training for CU-Boulder graduate students and for museum professionals who seek to upgrade their skills and credentials. The museology certificate serves a range of disciplines in the arts and sciences, education, and engineering, as well as the Colorado museum community.

The curriculum for the professional certificate consists of the core museology sequence for the Museum and Field Studies degree program:

MUSM 5011 Introduction to Museum Studies and  
 Three of the following five courses:  
 MUSM 5030 Museum Education  
 MUSM 5031 Exhibit Development  
 MUSM 5041 Museum Administration  
 MUSM 5051 Collections Management  
 MUSM 6110 Seminar in Museum Issues

This 12-credit curriculum is supplemented by a 75-hour internship (which may be waived for comparable professional experience).

## Power Electronics

Power electronics is a key enabling technology in essentially all electronic systems ranging from wireless communication devices, portable and desktop computers, to telecommunication infrastructure systems and industrial systems. The necessity for power electronics technology in these rapidly expanding areas creates a rising need for design engineers equipped with knowledge and skills to follow sound engineering principles and actively participate in multidisciplinary teams. The power electronics field has evolved rapidly with the advances in technology and introduction of many new application areas. As a result, it is likely that the required knowledge and skills were not in the curricula when many of today's professionals were in college. This creates a strong ongoing demand for continuing education of the workforce in the area of power electronics. The certificate program addresses the ongoing demand for skilled power electronics design engineers.

This program offers an opportunity for electrical engineers to obtain the specialized knowledge required to practice power electronics. It is intended for students and engineers having a BS degree in electrical engineering or equivalent.

The courses required for the professional certificate in power electronics are:

ECEN 5797 Introduction to Power Electronics  
 ECEN 5807 Modeling and Control of Power Electronic Systems  
 ECEN 5817 Resonant and Soft-Switching Techniques in Power Electronics

The certification program was initiated by the Colorado Power Electronics Center, and is operated through the Department of Electrical, Computer, and Energy Engineering and through the Center for Advanced Engineering and Technology Education (CAETE). A grade of B- or better is required for each

course applied toward the certificate. For more information, go to [ece.colorado.edu/academics/cert\\_programs/overview.html](http://ece.colorado.edu/academics/cert_programs/overview.html).

## Software Engineering

Experienced software professionals work in a field that has maintained a relentlessly rapid rate of change for decades, making it impossible to stay current in all aspects of software engineering. Those with limited experience find that the challenges of work assignments exceed their preparation from most undergraduate degree programs. In a typical computer-related undergraduate curriculum, it is not possible to devote enough credit hours specifically to software engineering to address all aspects of engineering complex systems including, for example, design for maintainability, concurrency, and distributed systems.

The professional certificate in software engineering, offered by the Department of Electrical and Computer Engineering and the Division of Continuing Education, covers the body of knowledge necessary to develop products more predictably and reliably for stand-alone programs as well as for software in more complex environments. The courses required for the professional certificate in software engineering are:

ECEN 4033/5543 Software Engineering of Stand-alone Programs  
 (same as CSCI 5548)  
 ECEN 4043/5043 Software Engineering of Multi-program Systems  
 ECEN 4053/5053 Software Engineering of Distributed Systems

Applicants for the certificate program must have received or currently be enrolled in a baccalaureate degree from an accredited institution and have satisfied the prerequisites for each course through class work or work experience. They need not be enrolled in a degree-granting program at CU-Boulder. A grade of B- or better is required for each course applied toward the certificate. For more information, visit [ece.colorado.edu/academics/cert\\_programs/overview.html](http://ece.colorado.edu/academics/cert_programs/overview.html).

## Telecommunications

Students entering either the Computer and Network Security or the Wireless Network and Technologies Certificate program should be professionally familiar with data networks and/or telecommunications networks. Familiarity with security procedures or at least one wireless system, respectively, would be an advantage. Alternatively, students should take the following courses and pass with a 3.000 GPA or better before enrolling in either certificate program.

TLEN 5330 Data Communications 1  
 TLEN 5460 Telecommunications Systems Lab

Visit the Interdisciplinary Telecommunications Program website at [telecom.colorado.edu](http://telecom.colorado.edu) to further explore application and admission details.

### *Computer and Network Security (12 credit hours)*

To understand network security requires more than simply taking an introductory course on network security; it requires a comprehensive understanding of not only how networks operate but also how users behave on the network. Simply designing a technically secure network fails to appreciate the social engineering vulnerabilities facing modern networks. To actually protect networks requires a detailed and well-executed process, one that includes substantial technical, behavioral, economic, accounting, and policy understanding. Therefore, students must gather a wide range of training and experiences to truly understand what is required to secure a network.

The certificate provides a broad range of coverage and includes not only the fundamentals of how networks operate and how to secure these networks, but also covers how to approach security in a practical manner. Security issues and topics range from technical theory to legal procedures. The curriculum consists of two required core courses and two electives.

#### Core Courses

TLEN 5530 Applied Network Security  
TLEN 5540 Network Security Lab

#### Electives

ECEN 5022 Cryptography  
TLEN 5420 Foundations of Computer and Network Security  
TLEN 5490 Network Programming  
TLEN 5832 Privacy, Security, and Digital Rights Management

#### *Wireless Network and Technologies (12 credit hours)*

Wireless is everywhere. There are almost twice as many cell phones in the world today as there are wireline service connections. Cell phone users not only make trillions of phone calls, but they also sent trillions of text messages from their cell phones. Wireless local area networks (LANs) and hotspots are gaining ground in the marketplace, and new wireless technologies and standards are being developed to further advance the wireless world. Personnel are needed in many positions to understand wireless technologies. Network administrators and technicians must know what a given product can and cannot do, how to select the right product, how to deploy a reliable wireless network, how different wireless products might interact, and the security and vulnerability characteristics of wireless networks.

Higher-level management should understand the regulatory and legal aspects of owning and operating wireless networks as well as the cost-benefit tradeoffs between wireless and non-wireless options. Managers should also understand the opportunities now offered by new-generation (3G) cell phone technologies in maintaining contact with mobile employees. The certificate program covers a range of wireless and LAN issues, and includes topics ranging from technical theory to legal procedures. It is designed to satisfy the needs of students with technical, legal, or business backgrounds. The curriculum consists of two required core courses and two electives.

#### Core Courses

TLEN 5510 Wireless and Cellular Communications  
TLEN 5520 Wireless LANs

#### Electives

ASEN 5190 GPS Technology  
CSCI 5273 Network Systems  
ECEN 5692 Communication Networks  
TLEN 5190 Standardization and Standards Wars  
TLEN 5260 Law for the Information Age  
TLEN 5350 Satellite Communication Systems  
TLEN 5440 Multimedia Networking  
TLEN 5470 Signaling Protocols

### Research Support

The University of Colorado at Boulder takes an active part in research in a wide variety of fields.

Nearly \$340 million in sponsored research and programs was generated this past year. Research and training grants and contracts awarded by various agencies of the federal government are the principal sources of these funds. The University of Colorado's research activity is also supported by appropriations from the state of Colorado, private foundations, and private

industry. For more information, visit [www.colorado.edu/VCResearch/research](http://www.colorado.edu/VCResearch/research).

### Research Institutes

**The Cooperative Institute for Research in Environmental Sciences (CIRES)** is jointly sponsored by the University of Colorado and the National Oceanic and Atmospheric Administration (NOAA). CIRES employs almost 500 faculty, students, and staff from a variety of disciplines. Academic departments represented in CIRES are astrophysical and planetary sciences; atmospheric and oceanic sciences; chemistry and biochemistry; ecology and evolutionary biology; geography; geological sciences; electrical and computer engineering; mechanical engineering; and physics. The institute serves as a center for multidisciplinary collaboration among environmental scientists from Boulder and throughout the world. A visiting fellowship program enables scientists from other institutions to spend time at CIRES.

CIRES research programs involve field investigations conducted in the mountains of Colorado, the Aleutian Islands, the Arctic and Antarctic regions, Hawaii and various Pacific atolls, and elsewhere. Results of this research bear on such practical societal problems as destruction of the Earth's ozone shield by pollutants, acid deposition in rain and snow, degradation of air and water quality, toxic waste treatment, understanding climate change, and earthquake prediction.

Current CIRES research programs, in which approximately 45 graduate students participate, can be grouped into four areas. In environmental chemistry and biology, ongoing research involves measurements of constituents and reactions in the atmosphere, kinetics of reactions in the stratosphere and troposphere, aerosol chemistry, and leaching of toxic wastes from mining. Studies of atmospheric and climate dynamics include air-sea interactions, dynamics of the atmospheric boundary layer, ocean dynamics, ice nucleation physics, cryosphere-climate interactions, ice sheet dynamics, and contemporary and paleo-climatology.

Research in solid earth geophysics includes earthquake prediction and earthquake physics, plate tectonics, seismic wave propagation, nuclear test discrimination, rock deformation and fracture, strains and tilts associated with Earth tides and secular deformation, and normal modes of vibrations of the Earth.

The Cryospheric and Polar Processes division is a national leader in the study of polar processes. Its research emphasizes studies in high latitude regions, using numerical techniques and satellite remote sensing. Research activities are supported by the World Center-A for Glaciology, the National Snow and Ice Data Center, and the Snow and Ice Distributed Active Archive Center.

**The Institute of Arctic and Alpine Research (INSTAAR)** is an Earth and environmental systems institute that investigates how the Earth's environment is affected by natural and human-induced physical and biogeochemical processes at local to global scales. INSTAAR is home to interdisciplinary studies of Quaternary and modern environments, geochronology, human and ecosystem ecology, hydrology, oceanography, landscape evolution, biogeochemistry, cold regions research, and past-to-present climate variability. INSTAAR consists of over 70 PhD level scientists, including 16 tenured or tenure track faculty from across campus (geological sciences, environmental and evolutionary biology, geography, environmental studies, civil engineering, anthropology). About 60 graduate students from eight departments are working in INSTAAR laboratories. Another 60 undergraduates work and do research with INSTAAR researchers and teachers. Including federal scientists and affiliates (USGS, NOAA,

NCAR), post-doctoral fellows, and operational and administrative staff, the institute consists of just over 200 members.

INSTAAR's Ecosystems Group focuses on biocomplexity, carbon sequestration, nitrogen cycling, alpine biodiversity, ecosystem disturbance and recovery, atmospheric dynamics and chemistry, eco-hydrology and engineering, and invasive species. The Geophysics Group applies quantitative field geodynamics and numerical methods to discover the properties, patterns, and dynamics of snow, ice, water, and sediments in the world's oceans, glaciers, and land areas. The Past Global Change Group focuses on the reconstruction of the dynamics of past environments and climate variability to enhance our understanding of the interactions between all components of the Earth system: atmosphere, ocean, land, ice, and biosphere, including humans.

Major facilities and programs at INSTAAR include: Long-Term Ecological Research studies in alpine and polar regions; The Mountain Research Station, a world-class complex of laboratory and field facilities to support year-round alpine research efforts; an Environmental Computation and Imaging Facility powered by a supercomputer with global connections to geophysical databases and nationally developed software; the Center for Geochemical Analysis of the Global Environment, which promotes the development and application of analytical methods that reveal past and present changes in Earth's climate, its land surface, and major biogeochemical cycles; a Front Range Carbon Cycle Consortium that determines the stocks, exchange fluxes, and stability of carbon, and expands the educational opportunities in carbon biogeochemistry; a national multi-institutional facility for developing a Community Surface-Dynamics Modeling System to predict the transport and accumulation of sediment and solutes in terrestrial landscapes and sedimentary basins; 35 high-quality analytical labs, including unique campus wide facilities; and the international *Arctic, Antarctic and Alpine Research* journal.

**The Mountain Research Station**, located at 2,900 meters (9,500 feet) in the Front Range of the Rocky Mountains, is operated for the university by INSTAAR. The station, a national center for field studies in the biological and physical sciences, is especially well known for long-term ecological, climatological, and atmospheric research.

The station offers researchers easy access to a variety of terrestrial and aquatic habitats at altitudes from 1,500 meters to 3,800 meters. A wide variety of courses is offered in areas such as plant and animal ecology, climatology, geomorphology, and hydrology. The station maintains the mountain climate program in support of the environmental field research conducted in the area.

Weather observing stations have been operated since 1952 at four altitudes between 2,200 and 3,750 meters, and additional stations are established for new projects.

**The Institute for Behavioral Genetics (IBG)** is one of the top research and training facilities in the world for genetic research on behavior. This rapidly developing field brings to bear upon behavioral research the perspectives of biochemical genetics, developmental genetics, evolutionary genetics, molecular genetics, pharmacogenetics, and statistical and quantitative genetics. IBG is home to one of the nation's largest DNA repositories for research on human behavior, as well as housing a wide array of behaviorally and genetically defined lines of selected, recombinant inbred, transgenic, and knockout-gene mice. Facilities are available for research on a variety of organisms, including humans, laboratory mice, and nematodes. Current research includes studies of aging, psychopathology, reading disability,

cognition, substance abuse, behavioral development, and evolution. IBG provides NIH-supported training opportunities, at the postdoctoral and predoctoral level, in affiliated programs at the University of Colorado campuses in Boulder and Denver.

**The Institute of Behavioral Science (IBS)** is an interdisciplinary research organization serving faculty and graduate students in the behavioral sciences. Its principal functions are to conduct and sponsor research programs involving two or more of the behavioral sciences and related fields; to provide research facilities, equipment, and administrative services for participating faculty; to facilitate graduate and undergraduate research training; and to disseminate information about its activities and findings to scientific groups and institutions.

The institute sponsors research programs in environment and society, political and economic change, population, and problem behavior. IBS includes Computing and Research Services which provides assistance and training in social science methods, statistics, and computing; the Center for the Study and Prevention of Violence; the Natural Hazards Research and Information Center, and the African Population Studies Research and Training Program.

**The Institute of Cognitive Science (ICS)** was established to promote interdisciplinary research in the fields of psychology, computer science, linguistics, philosophy, education, speech/language/hearing sciences, and other cognitive sciences. Its major research programs fall into six areas: neuroscience; natural language processing; human-computer interaction and knowledge-based systems; connectionist modeling; human information processing and skilled performance; and judgment and decision making. These programs include the use of artificial intelligence techniques and cognitive simulations in gaining an understanding of basic cognitive processes as well as educational and industrial applications.

**JILA** has been one of the nation's leading research institutes in the physical sciences since its founding in 1962. A joint institute of the University of Colorado and the National Institute of Standards and Technology, JILA is located on the CU-Boulder campus. JILA's NIST members hold adjoint faculty appointments at CU. The Departments of Physics, Chemistry and Biochemistry, Astrophysical and Planetary Sciences, Molecular, Cellular, and Developmental Biology, and Electrical and Computer Engineering are affiliated with JILA.

Through the years, JILA scientists have made key contributions to applied technology, including advanced, ultrafast lasers; precision mirror mounts; laser stabilization techniques; femto-second optical and ultraviolet frequency combs; high-finesse optical cavities; a nonlinear optical system for blind signal separation; precision measurements of optical frequency standards; novel designs for optical atomic clocks; high-precision gravimeters; and software that delivers international time standards over the Internet. Scientists trained at JILA have joined such firms as Amgen, Ford, Hewlett Packard, Intel, and 3M; numerous entrepreneurial companies; the Massachusetts Institute of Technology's Lincoln Laboratory, Argonne National Laboratory, the National Renewable Energy Laboratory, and other major laboratories; and universities throughout the world, including Harvard University, the Massachusetts Institute of Technology, Oxford University, the University of California, the University of Tokyo, the Weizmann Institute of Science, and Yale University.

JILA scientists also explore some of today's most challenging and fundamental questions in physics. Their research ranges from the small, cold world of quantum physics through the design of precision optics and lasers to processes that shape the

stars and galaxies. The institute's research spans seven broad categories: astrophysics, atomic and molecular physics; biophysics; chemical physics; materials physics and chemistry; optical physics; and precision measurement.

The institute's faculty includes two Nobel laureates, seven members of the National Academy of Sciences, and two John D. and Catherine T. MacArthur Fellows. JILA offers advanced training for visiting academic and industry scientists, postdoctoral fellows, and CU graduate students. Creative collaborations among JILA Fellows and their groups play an important role in generating the pioneering research JILA is known for around the world. This rich mix of research and educational experience make graduate study at JILA a distinctly interdisciplinary endeavor. Each year, the institute attracts many scientific visitors and seminar speakers. Graduate students can also attend in-house courses in laboratory electronics, instrument making, computing, and scientific writing.

JILA's facilities comprise a 10-story tower containing offices for scientists and administrative support staff, a 128-seat auditorium, and a laboratory wing with an isolated, underground research bay. A four-story south wing contains computing systems, laboratories, a reading room, meeting rooms, and private offices. The institute supports its research and education with electronics and instrument shops; computing, networking, and administrative services; the W. M. Keck Optical Measurement Laboratory; and a Scientific Reports Office.

A brochure describing JILA is available from the JILA Chair, University of Colorado at Boulder, 440 UCB, Boulder, CO 80309-0440 (303-492-6787) or at [jilawww.colorado.edu/print](http://jilawww.colorado.edu/print).

**The Laboratory for Atmospheric and Space Physics (LASP)** is a research institute carrying out basic research in space science, including in planetary, atmospheric, solar, and space physics. LASP is one of a very small number of university-based groups that is able to design, build, test, and operate spacecraft instruments and even entire spacecraft. Due to its broad approach, LASP activities span the entire research cycle, including designing and fabricating instruments to address scientific questions, flying the instruments and analyzing data returned from them, integrating the results with laboratory and theoretical analyses, and developing the next generation of questions to address, supported by laboratory and theoretical analyses that provide a broad context for understanding the scientific questions and results.

LASP has active instruments on several spacecraft, including the Cassini mission to Saturn, the *MESSENGER* spacecraft that is studying Mercury, the *SORCE* and *TIMED* spacecraft that are in Earth orbit studying the Sun's influence on the Earth's atmosphere, and on the *AIM* spacecraft to study the Earth's mesosphere. A student-designed and -built instrument is currently on its way to Pluto aboard the *New Horizons* spacecraft. Instruments are currently being designed and built to fly on the Solar Dynamics Observatory spacecraft that will study the influence of the Sun, and for the Radiation Belt Storm Probe mission that will study the Earth's radiation belts. LASP researchers also are involved in analyzing data from the Mars *Global Surveyor*, Mars Odyssey, Mars Reconnaissance Orbiter, Mars Exploration Rover and Phoenix missions, and in planning for upcoming data analysis from the Mars Science Laboratory mission.

Students and faculty from the Departments of Astrophysical and Planetary Sciences, Atmospheric and Ocean Sciences, Physics, Geological Sciences, and Aerospace Engineering pursue their research under the auspices of LASP. LASP is home to the Center for Astrobiology, part of the NASA Astrobiology Institute, through which scientists from many disciplines across cam-

pus work to understand the potential for life to exist elsewhere in the universe, and the Center for Integrated Space Weather Modeling (CISM), whose goal is to understand the nature of the Earth's space weather environment. LASP has approximately 200 full-time professionals, including 60 scientists and 75 engineers, and 100 students at any point in time. This high student-to-professional ratio is indicative of the high level of collaboration between students and professionals. LASP graduates have gone on to play important roles in spacecraft mission design and operation, science analysis, and in the astronaut corps.

LASP's space research programs are recognized internationally. The combination of mission operations, instrument development, science analysis, and student involvement in all aspects of its programs is unique in the world. For additional information about LASP and its current programs, visit [lasp.colorado.edu](http://lasp.colorado.edu).

## Renewable and Sustainable Energy Institute (RASEI)

The Renewable and Sustainable Energy Institute (RASEI), an interdisciplinary joint research effort between the University of Colorado at Boulder and the National Renewable Energy Laboratory (NREL), is advancing solutions for producing energy economically from low carbon sources, decreasing reliance on foreign oil, reducing greenhouse gas emissions, and using energy more efficiently to meet the global energy challenge.

RASEI's efforts focus on interdisciplinary energy research, training the next generation of energy professionals, and the development of market-ready leading-edge technologies.

Learn more about the RASEI at [rasei.colorado.edu](http://rasei.colorado.edu).

## Research Centers

(A comprehensive list of active research centers can be found at [www.colorado.edu/research/institutes/index.html](http://www.colorado.edu/research/institutes/index.html).)

**The Business Research Division** performs contract research and provides the Colorado business community with information and special studies on the state's economy and business problems. The division is also responsible for the organized research activities of the Leeds School of Business, which are conducted through three organizations. **The Rocky Mountain Trade Adjustment Assistance Center** provides management assistance, business information, and consulting services to small and medium-sized businesses in the region. **The Mid-America Manufacturing Technology Center Colorado**, with locally based field engineers and project management staff, provides on-site assessments of the business and technical aspects of small manufacturing operations in the state and recommends priority actions to improve a company's competitive position.

The College of Engineering and Applied Science oversees 16 interdisciplinary research centers whose programs augment discipline-based research in traditional academic fields. These research centers have a wide variety of research foci such as the commercial development of space (**BioServe**); decision support for water and environmental systems (**CADSWES**); computer simulations in aerospace structures (**CAS**); astrodynamics research (**CCAR**); Joint Center for Combustion and Environmental Research (**JCCER**); photopolymerization methods (**CFAP**); power electronics (**CoPEC**); pharmaceutical biotechnology (**CPB**); Research and Engineering Center for Unmanned Vehicles (**RECUV**); lifelong learning and design (**L3D**); separations using thin films (**MAST**); advanced environmental sensors (**CET**); biofuels and biorefining (**C2B2**); real-time hybrid simulations for earthquake engineering (**FHT**); integrated micro/nano-electromechanical transducers (**iMINT**); and environmental mass spectrometry (**CEMS**).

**The Center for Astrophysics and Space Astronomy (CASA)** is a research center within the Department of Astrophysical and Planetary Sciences. CASA provides a focus for campuswide expertise in experimental, observational, computational, and theoretical astrophysics, including solar and stellar physics, interstellar and intergalactic medium studies, star and planetary system formation, galactic and extragalactic astrophysics, and cosmology. Staff members carry out research involving x-ray, far-UV, optical, infrared, submillimeter, and radio observations using both satellites and ground-based facilities.

CASA scientists play leading roles in data analysis for NASA astrophysics missions such as the Hubble Space Telescope. CASA instrumentalists manage an active sounding rocket program, develop millimeter instrumentation for the Caltech Submillimeter Observatory, APEX telescope, and Herschel Space Observatory, built the spectrographs for the Far Ultraviolet Spectroscopic Explorer (FUSE) and the Cosmic Origins Spectrograph (COS), which may be installed in the Hubble Space Telescope in 2007. CASA students and researchers also built the Near Infrared Camera for use on the Apache Point Observatory 3.5m telescope.

Other CASA programs include laboratory experimentation on molecules of astrophysical interest, space and ground-based observations in all wavelength bands from x-ray to radio, extensive numerical modeling of the evolution of matter in the early universe to study the formation and evolution of galaxies and intergalactic medium, and theoretical investigations in many areas of astrophysics.

**The Center for British and Irish Studies** promotes research in all aspects of British culture, history, and contemporary life. Its resources include the outstanding research collections of the University of Colorado Libraries, including a wide range of microfilmed copies of original materials from Britain. The center is the leading research facility in British studies in the Rocky Mountain/high plains area.

The center sponsors visiting lecturers, colloquium series, and conferences, and serves as a gathering point for scholars and students in the region. It welcomes outside users of the research collections and continues to develop the research base. The center also cooperates with community groups in sponsoring activities dealing with British politics, business, and the arts.

**The Center for Labor Education and Research (CLEAR)** conducts labor education programs and research in various aspects of labor relations. Noncredit courses are offered for members of organized labor as the university's service to the labor community of Colorado. Graduate students may attend conferences with staff members and use available library facilities. CLEAR staff members also teach credit courses in other schools and colleges.

**The Policy Sciences Center** stresses the integration of knowledge and practice to improve public policy. The research program includes policy analysis in such areas as environment, natural resources, poverty, growth management, and economic development, as well as the development of theory and methods for the policy sciences. The center also supervises the public policy curriculum for the MA in political science (public policy option).

**The McGuire Center for International Economics**, organized within the Department of Economics, is dedicated to research and graduate training in a broad range of international topics. Specialties of faculty associated with the center include international trade and finance, monetary theory and policy, monetary history and reform, and economic development and macroeconomics. Research on questions concerning international debt and trade relations in the Pacific region is given particular

emphasis and support. The center offers opportunities for students and faculty interested in interdisciplinary work between international economics and areas such as international politics, conflict and peace studies, and international business.

## Laboratories and Special Equipment

Laboratories, special classrooms, and specialized equipment are essential to graduate training and research. Some of the facilities at the University of Colorado are described in the following paragraphs.

**Aerospace engineering sciences** is equipped with both high-end workstations and PCs, an educational wind tunnel, laboratories in structural dynamics and controls, a guidance and control laboratory, a Global Positioning System laboratory, and the Lockheed Martin Room, dedicated to senior design teams. Space hardware laboratories aid in developing expertise in electronics, structures, fluids, and thermal control for the development, testing, and operation of small payloads; and space biotechnology laboratories develop expertise in microgravity studies involving animal physiology, agricultural products, bioprocessing, and advanced spacecraft life support systems. An unmanned vehicles systems integration laboratory provides learning opportunities for sophisticated subsystems integration. Computer laboratories are equipped for use in upper-division and graduate courses and for graduate research, with special capabilities for computer-aided control systems design, satellite image processing, satellite mission design, and parallel processing for computational structural mechanics, fluid dynamics, control, acoustics, and optimization. A NOAA satellite receiving station is available to the department for use in teaching and research.

**The Department of Astrophysical and Planetary Sciences** emphasizes studies of theoretical, instrumental, and observational astrophysics (including the sun), planetary atmospheres and surfaces, astrophysical fluid dynamics, space physics, and plasma astrophysics.

The department is a member of the ARC 3.5m telescope consortium and operates the Sommers-Bausch Observatory and laboratories for space astrophysical hardware, computational fluid dynamics, and UV/IR/X-ray astronomy. Also used are observational facilities of Cerro Tololo Inter-American Observatory in Chile; the Kitt Peak National Observatory in Tucson, Arizona; the Very Large Array (VLA) in New Mexico; and many NASA astronomical and planetary satellites, such as the Hubble Space Telescope, *Galileo* and *Cassini* Spaceprobes, and Far Ultraviolet Spectroscopic Explorer. Teaching and research are conducted in collaboration with the Laboratory for Atmospheric and Space Physics (LASP), JILA, the National Center for Atmospheric Research (including the High Altitude Observatory), and the Center for Astrophysics and Space Astronomy (CASA).

**Chemical and biological engineering research facilities** are extensive and modern. Nearly all research equipment is interfaced to microcomputer systems for automated data collection, monitoring, and control.

Studies in heterogeneous catalysis and surface science use ultrahigh vacuum systems located in the chemical engineering laboratories.

Research in chemical process control makes extensive use of an array of real-time computer systems and experimental units.

The suspension fluid dynamics laboratories include microfilers, sedimentation devices, and particle size analyzers.

Membrane studies use casting machines for fabricating flat sheet and hollow fiber membranes, and a variety of analytical equipment. A pendant drop tensiometer is used to study mem-

brane formation via interfacial polymerization. A differential scanning calorimeter is used for determining the glass-transition and crystallization temperatures as well as other properties of polymeric membrane materials.

The biotechnology research laboratories are equipped with highly instrumented and controlled fermenters, high-performance liquid chromatographs, a flow cytometer, a tissue-culture laboratory, a DNA microarray facility, a UV-vis scanning spectrophotometer, an electron paramagnetic resonance spectrometer, a phosphorescence imager, centrifuges, and other standard bioprocess and bioanalytical equipment.

In the polymer laboratories, the latest differential scanning calorimeter is used to study photopolymerization reactions and phase transitions. Nonlinear optical polymeric materials are characterized on an optical bench equipped with a Neodymium/YAG laser and photo detection system. The laboratories are also equipped with a Hewlett Packard UV-visible spectrophotometer and facilities to perform photopolymerizations to produce membranes and polymer films.

The ceramics processing laboratory includes a high-temperature furnace, a thermal gravimetric analyzer, and several fluidized beds.

research encompasses the infrastructure of our modern society, which depends on the technologies of structural, geotechnical, environmental, water resources, building systems, and construction engineering. Research facilities include unique laboratories for multiscale simulation of civil, environmental, and building systems. A 400 g-ton centrifuge with a sample capacity of two tons is used for simulation of the behavior of earthen and structural systems. The department has one of the 15 NSF-supported George Brown National Network for Earthquake Engineering Simulation facilities in the United States for dynamic testing of the response of large structural elements to earthquakes. The Larson Building Systems Laboratory contains a full-size room with complete HVAC controls for the study of energy efficiency, comfort, and room air quality in buildings. The environmental fluid mechanics laboratory contains a large capacity hydraulic flume equipped with a 3-D laser system for visualization of turbulence and mixing in order to study aquatic ecology and contaminant dispersion in surface waters. In addition, numerous research projects are carried out in multipurpose laboratories on the Boulder campus and at field sites from Colorado to Antarctica. The department maintains significant computing facilities for research in diverse areas such as construction project management and groundwater contaminant transport. The Center for Advanced Decision Support for Water and Environmental Systems develops software that is widely used in river basin management throughout the United States. Drawing on these facilities, faculty and students have initiated interdisciplinary research that seeks to apply emerging analytical methods such as life-cycle analysis to study the long-term interactions between built infrastructure (building, transportation, and hydraulic structures), the environment, natural resources, and the concerns of human society for safety and well-being.

**The Department of Computer Science** supports its own domain ([cs.colorado.edu](http://cs.colorado.edu)), which is a 10/100/1000 mb network connected to the campus and the world by gigabit fast ethernet. The department has been instrumental in pushing the campus to a faster networking model through research. Research and computing needs are handled by department staff. Computer science supports most architectures and operating systems, giving research students the opportunity to learn about and use the latest, greatest equipment and software.

Current hardware inventory includes Sun Microsystems workstations and servers, Digital Compaq workstations, an Alpha and DS20 parallel processing cluster, Macintoshes and Windows 2000 desktop workstations, HP workstations, NCD xterminals, and various computers. All are networked with 10/100/1000 mb networks connected with switches and hubs to a firewalled gateway.

**Electrical and computer engineering** special equipment and facilities include a class 1000 clean room facility for epitaxial growth and fabrication of microwave and optical devices, high-vacuum and vacuum deposition equipment for thin-films research, an integrated circuits laboratory, ion implantation equipment, crystal growing facilities, a systems and control laboratory, a laboratory for data storage research, a digital system design laboratory, a power electronics design laboratory, undergraduate laboratories in circuits, electronics, and energy conversion, several holography and optics laboratories, a computer laboratory for VLSI design, a microwave device research laboratory, a communications laboratory, a roof-mounted antenna range, numerous special-purpose computers, an anechoic chamber for studying propagation effects at microwave frequencies, a special microscope for laser manipulation of microorganisms *in vivo*, and an electromagnetic fields bio-effects laboratory.

The department has a variety of computing equipment to support its research and instructional activities. Most machines are connected via Ethernet, which also provides access to a large number of shared computing resources on campus.

**Mechanical engineering** laboratories provide for experimental studies of thermal, mechanical, and electronic systems. Typical areas of study include heat transfer, fluid and solid mechanics, mechanical behavior of materials, combustion, prosthetic device performance, electronic packaging and manufacturing, and design optimization.

The combustion laboratory contains instrumentation for velocity, temperature, and composition measurements in chemically reacting flows. Included are systems for gas chromatography, laser-induced fluorescence spectroscopy, laser absorption spectroscopy, laser schlieren, laser interferometry, and laser doppler anemometry. The laboratory is also equipped for computer control of the instrumentation and automatic data reduction including graphics capabilities.

The materials laboratory is well equipped for the measurement of the physical and mechanical properties of polymers, metals, ceramics, and composites. Major facilities include a pressure dilatometer with capabilities to 200 MPa and 450°C for determination of solid and melt equations of state, a forced-oscillation dynamic mechanical analyzer as well as a large capacity torsion pendulum for measurement of modulus and damping behavior, a modern servohydraulic mechanical test system for the analysis of tensile and relaxation properties, and an acoustic microscope for morphological studies.

The fluid mechanics laboratory is equipped with several basic facilities for experimentation in fluid systems. The Stokes flow apparatus is devoted to measurement of drag in highly viscous fluid flow using laser-timer instrumentation. The Taylor-Couette apparatus incorporates thermistor sensors, laser sheet visualization, and computer data acquisition to study instabilities of fluid motion between rotating cylinders with a radial temperature gradient. A humidity-controlled room provides an environment for studying the stability of rotating capillary rivulets. A Ling vibration exciter provides the basis for g-jitter experiments on the stability of differentially heated fluid layers.



The packaging laboratory is equipped with a quick prototyping workcell for semicustom multichip modules, two fluxless solder reflow chambers, a thermosonic flip-chip bonding machine and a thermal-chip testing system. The electronic manufacturing laboratory houses a mock-up chemical vapor deposition reactor, a condensation soldering set-up, a wind-tunnel for testing various high performance heat sinks, and a Czochralski crystal growth simulator. This equipment supports work on novel packaging and process control techniques, including artificial neural networks and fuzzy logic.

**The Mechatronics Laboratory** has state-of-the-art facilities to lay out MEMS designs using Tanner Research Tools and Intel-CAD simulation software. The laboratory has probe stations equipped with computer control, video cameras, and power supply units. Personnel are able to activate, record, and evaluate MEMS to be fabricated for the proposed study.

Various optical instruments are available to verify the electromechanical behavior of fabricated MEMS in real time as a function of environmental temperature and pressure. For temporal response studies, an optical interferometer is available. For static deformation studies, a Zygo Interferometric Microscope (New View 200) is available in the **MEMS R&D Laboratory**. This imaging system uses noncontact scanning white light interferometry and provides 3-D surface analysis with Z-scan from 1 nm to 5,000  $\mu\text{m}$  with 0.1 nm height resolution. The field of view is adjustable from 1  $\mu\text{m}$  to 50 mm. With this unique system staff can visualize and study any MEMS deformation induced by internal material stresses and/or applied external forces, as well as the wear effects due to friction.

**The Nuclear Physics Laboratory**, of the Department of Physics, conducts research in high-energy nuclear physics, the study of quark-gluon systems in nature. Current activities include experimental studies of a new form of matter, known as the quark-gluon plasma, created in high-energy collisions of heavy nuclei, and the precise determination of the internal structure of the proton using high-energy particle beams.

Graduate students and faculty of the laboratory develop and install experimental equipment, help run the experiments during accelerator operation, and then analyze their data, both at the accelerator facilities and in the Boulder lab facilities. The present research is performed primarily at the Relativistic Heavy Ion Collider at Brookhaven National Laboratory, along with questions still under study at DESY (Germany), Fermilab, and Jefferson Lab.

Theoretical activities focus on development of Effective Field Theory (EFT) methods for treating low-energy (or, equivalently, diffuse) systems whose underlying dynamics are governed by short-ranged interactions. Many topics of much current interest (nuclear few-body systems, BECs, etc.) are susceptible to treatment via these methods.

Support for the research program comes from the U.S. Department of Energy and the National Science Foundation. Consult [up.colorado.edu/CUNuclearPhysics](http://up.colorado.edu/CUNuclearPhysics) for more detailed information.

**The High Altitude Observatory (HAO)** is an internationally recognized center for the study of solar, solar-terrestrial, and related astrophysics with emphasis on the interrelationships. Established in 1940, HAO has its central laboratory and administrative offices in the National Center for Atmospheric Research (NCAR) building in south Boulder.

HAO is a part of NCAR, which is sponsored by the National Science Foundation. HAO's extensive research facilities are used by graduate students pursuing advanced studies in atmospheric sciences and physics.

# School of Journalism and Mass Communication

*Paul S. Voakes, dean*

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school website: [www.colorado.edu/journalism](http://www.colorado.edu/journalism)



**T**HE SCHOOL OF JOURNALISM AND MASS COMMUNICATION offers a next-generation media education that prepares its graduates to collaborate within the professional world, engage the public, and produce positive social change.

The school uses innovative teaching technologies, empowering strategies for responsible democratic engagement, and an integrated curriculum to foster excellence among its students. Students are trained for successful careers in advertising, broadcast, print and online media, photojournalism, public relations, and media analysis.

By encouraging students to apply civic responsibility in their media work, the School of Journalism and Mass Communication seeks to empower audiences through honesty, integrity, and a commitment to social progress. Students learn the significance of their role as media professionals, gaining an appreciation of the profound interactions between mass communication and society in order to approach their work with respect, openness, and a broader cultural perspective. Included in a broad array of professional and conceptual courses are offerings in global media. A large percentage of the school's students study abroad.

The school is also home to two internationally recognized centers: the Center for Media, Religion and Culture; and the Center for Environmental Journalism.

## Diversity

The school is actively committed to helping media organizations reflect the diversity of the communities they serve. It does this through focused recruitment and retention efforts aimed at preparing underrepresented students with the skills and support to excel as media professionals.

## Media Opportunities

The school takes full advantage of its proximity to Denver, a major media market. Distinguished media professionals regularly serve as adjunct faculty. Hundreds of Denver and Boulder media organizations provide wide-ranging internship and career opportunities. Students consistently are offered highly competitive internships at leading Denver television and radio stations, newspapers, advertising agencies, public relations firms, and government, nonprofit, and corporate public information offices. Competitive internships are available locally and nationally to students at award-winning newspapers, magazines, advertising and public relations firms, government and social service agencies, radio and television stations, cable television systems, video production houses, online media, and other operations, including *USA TODAY*, *The Wall Street Journal*, *The*

*Washington Post*, *National Geographic*, *Sports Illustrated*, *Newsweek*, ABC, MTV, NewLine Cinema, National Public Radio, Leo Burnett, TBWA\Chiat\Day, CBS, NBC, CNN, Bloomberg, C-SPAN, and Discovery Channel.

## Facilities and Equipment

Technology is changing the way information is delivered, and the School of Journalism and Mass Communication is at the forefront of this shift, incorporating new technologies into its curriculum to make newsgathering, broadcasting, public relations, and advertising more accessible to audiences. Students use technology to create new media possibilities, renewing audience trust by collaborating with them to communicate important information. All lab courses—reporting, editing, advertising, public relations, radio, television, new media, and photojournalism—contain no more than 20 students. Broadcast students use a state-of-the-art digital broadcast studio in CU's ATLAS center with its 1,000-square-foot studio furnished with the latest equipment.

## Accreditation

The School of Journalism and Mass Communication is accredited by the Accrediting Council on Education for Journalism and Mass Communications. It is a fundamental principal of the ACEJMC that education for journalism be broadly based. Undergraduate students take about two-thirds of their college course work outside of the school and approximately one-third in the school.

## Undergraduate Programs

The school enrolls 600 students in five sequences. Students begin with a broad education in the liberal arts and finish with superior professional preparation and media studies instruction. Most students take advantage of the school's extensive internship listings to obtain significant media experiences.

In addition to the required courses, the school offers all students a wide range of classes in many aspects of media practice including photojournalism, electronic and digital journalism, advertising creative development, consumer behavior, publication design, magazine article writing, public relations principles and projects, and communication law.

Media criticism and analysis are also broadly represented in the curriculum through courses such as media institutions and economics, media ethics, mass communication history, international mass communication, and special-topics offerings.

Students who intend to apply to the school complete their freshman year of undergraduate work (a minimum of 30 semester hours) typically in the College of Arts and Sciences as pre-journalism and mass communication majors.

Upon completion of their studies in the school, students receive a bachelor of science degree in journalism from one of five sequences.

- Advertising
- Broadcast News
- Broadcast Production
- Media Studies
- News-Editorial

**The International Media Certificate** is designed for high-achieving majors in international affairs (IAFS) and journalism and mass communication (JOUR) at CU-Boulder. This certificate will open doors to international and world-area specializations for students in the School of Journalism and Mass Communication and will introduce international affairs students to careers in communication media. For more information, visit [www.colorado.edu/Journalism/globalmedia/imc/index.htm](http://www.colorado.edu/Journalism/globalmedia/imc/index.htm).

### Student Activities

Many successful alumni proudly trace their careers back to student-run media and professional organizations here. *CU Sports Magazine* is a weekly televised program that follows collegiate athletics. KVCU, the university's 24-hour radio station, broadcasts to the Denver area. *Cultural Currents* is a newsletter that focuses on issues of diversity in media coverage and personnel. *NewsTeam Boulder* is a twice-weekly cable news show produced by students in the advanced broadcast classes. The *CU Independent* is a student-run online news source for the campus, at [CUIndependent.com](http://CUIndependent.com).

All news-editorial students complete internships at local daily newspapers and magazines as reporters, copy editors, online editors, or photographers. Students participate in chapters of the Advertising Club, Society of Professional Journalists, the Multi-ethnic Media Organization (MEMO), Association for Women in Communication, and Journalism Board, the student government organization.

### Internships

An ambitious year-round program helps students locate quality internships suited to their specific career goals. Many students complete two or more internships by graduation. Students perform internships at magazines, weekly and daily newspapers, advertising and public relations firms, businesses, and at government and nonprofit agencies. Others do broadcast and cable television internships in Denver. Opportunities for multimedia internships abound.

Students regularly obtain nationally competitive internships through the Politics & Journalism Semester in Washington, D.C., the Dow Jones Newspaper Fund, American Society of Magazine Editors, the Advertising Club of New York, and the Chips Quinn Scholars.

In recent years students have served as interns at *The Wall Street Journal*, *USA TODAY*, *Skiing*, *Backpacker*, *Sports Illustrated*, *The Today Show*, High Noon Entertainment, MTV, Fox Sports, NBC, ABC, CBS, CNN, The Children's Hospital, and IBM and top ad agencies throughout the United States. These include Crispin Porter + Bogusky, Goodby, Silverstein & Part-

ners, DDB, BBDO, TBWA\Chiat\Day, Young & Rubicam, Saatchi & Saatchi, Leo Burnett, Publicis, and Arnold Worldwide.

Internships are also available in communities throughout the state, including Colorado's mountain resort areas.

### Careers

Graduates of the School of Journalism and Mass Communication hold key positions throughout the United States in advertising, news, entertainment, government, education, business, and law. Many participate in the rapidly expanding alumni Career Network to help new graduates get started in their field by providing advice and contacts. The Student Resource Center fields local and national job opportunities through its contacts with employers and hosts on-campus interviews with a wide variety of employers. The center also assists students and graduates by offering individual counseling and a regular series of workshops on résumé preparation, interviewing, and career planning specifically for media careers. The center maintains a library of media directories and career planning resources and offers students extensive lists of websites related to media jobs.

### Centers

Through the **Center for Environmental Journalism** the school seeks to enrich and elevate the quality, range, and significance of media coverage of environmental issues. The CEJ is home to the prestigious Ted Scripps Fellowships in Environmental Journalism, which provide working journalists with a one-year opportunity to deepen their understanding of environmental science, policy, law and journalism.

**The Resource Center for Media, Religion, and Culture** is a clearinghouse of information for those interested in exploring the intersection of religious and media-related practices in the everyday lives of contemporary adults and their families.

### Study Abroad Programs

The School of Journalism and Mass Communication, in conjunction with the Office of International Education, encourages students to participate in the university's study abroad programs. Study abroad usually is undertaken during the junior year. Since an additional semester may be necessary to meet graduation requirements, prospective majors are urged to plan early and seek advising from the journalism and mass communication assistant dean or coordinator of student services. Programs are offered in more than 70 countries worldwide. Information and application forms are available at the Office of International Education, University of Colorado at Boulder, 123 UCB, Boulder, CO 80309-0123, or [studyabroad.colorado.edu](http://studyabroad.colorado.edu).

### Academic Excellence

#### Dean's List

Students in the School of Journalism and Mass Communication who have completed at least 12 credit hours of CU-Boulder course work for a letter grade in any single semester with a term grade point average of 3.750 or better are included on the dean's list and receive a notation on their transcript and a letter from the dean.

#### Honors

Journalism and mass communication students may graduate with general honors and/or school honors. Students interested in general honors must consult the honors program office. The

school may award the bachelor's degree with honors to students who have a 3.500 cumulative GPA and a 3.500 GPA in journalism and mass communication courses, complete an independent study in journalism and mass communication involving scholarly research, and demonstrate a high degree of professional skill. Application for school honors must be made to the student's advisor the semester prior to the one in which the honors project would be done. Transfer students must complete at least 60 hours in residence. Complete information on honors requirements is available at the main office.

Students who achieve a 3.750 overall GPA will graduate with distinction. Students whose academic records rank in the upper 10 percent are eligible for election to Kappa Tau Alpha in recognition of outstanding scholastic achievement.

### School Awards and Scholarships

Alumni and friends of the school have made it possible to provide more than three dozen annual scholarships and awards to officially admitted students in the School of Journalism and Mass Communication. The deadline for application is February 20.

A. Gayle Waldrop Award  
 Arthur B. Levis Scholarship  
 Barrie Hartman News Editorial Scholarship  
 Boulder Press Club  
 Bob and Gloria Palmer Scholarship  
 Brian Hostetler Memorial Scholarship  
 Chris M. & Chris J. Burns Memorial Scholarship  
 Colorado Broadcasters Association  
 Colorado Press Women Scholarship  
 Courtney Erin Klee Memorial Scholarship  
 Curtis Michael Gimeno Memorial Scholarship  
 Denver Woman's Press Club Scholarship  
 Dan Creedon Sports Scholarship  
 Dominic Manzanares Memorial Scholarship  
 Don Ridgway/CHSPA  
 Dottie Roberts Foundation Scholarship  
 Ed Sardella Broadcast News Scholarship  
 Eugene Cervi Memorial Scholarship  
 Fred Casotti Sports Information Scholarship  
 Gerald C. Bean Memorial Scholarship  
 Gladys Van Vranken Parce Memorial Scholarship  
 Jerry and Lorna Gray Scholarship  
 J. Ember and Agnes Sterling Memorial Scholarship  
 John Holden Graduate Fellowship Award  
 J. Winton Lemen Memorial Scholarship  
 Karsh & Hagan Advertising Scholarship  
 Larry and Brigitte Zimmer Sports Announcing Scholarship  
 L. C. Paddock Memorial Scholarship  
 Leach Family Scholarship  
 Lehman Communications Corporation Scholarship  
 Mabee Memorial Scholarship  
 Marcella G. Hertzog/Georgene Carlson Memorial Scholarship  
 Mary Frances Berry Scholarship in Journalism  
 Nonie Lann Scholarship  
 North American Snowsport Journalism Scholarship  
 Philip John Coffey Scholarship Fund  
 Ralph Allen Scholarship  
 Raymond B. Johnson Memorial Scholarship  
 Rick and Linda Reilly News Editorial Scholarship  
 Teddy Ebersol Scholarship  
 William S. Hemingway Scholarships  
 William W. White Awards

## Academic Standards

### Scholastic Suspension

Journalism students are subject to suspension if they do not maintain a cumulative university GPA of 2.250 and a cumulative journalism and mass communication GPA of 2.500.

Students whose GPAs fall below either of these levels are normally placed on probation for one semester, during which they have an opportunity to raise their averages to the required levels. Students whose averages continue below the required levels are subject to suspension from the School of Journalism and Mass Communication and will be notified in writing.

Scholastic records will be reviewed as soon as possible after each semester, and students will be informed in writing if they are to be placed on probation or suspension.

The normal period of suspension is two regular semesters (one academic year, excluding summer sessions). The period of suspension will be stated in the suspension notice to the student. A student suspended a second time will be reinstated only on the basis of unusual circumstances, which the student should state in a petition to the assistant dean of the school.

### Academic Dishonesty

The School of Journalism and Mass Communication maintains the highest standards of intellectual honesty. Acts of academic dishonesty are referred to the Honor Council. The policies and procedures governing acts of academic dishonesty can be found on the Web at [www.colorado.edu/academics/honorcode](http://www.colorado.edu/academics/honorcode).

### Policy on Grade Appeals

The following shall be the official policy of the School of Journalism and Mass Communication regarding grade appeals.

When a student believes that a grade has been improperly assigned, and discussions between the instructor and the student have not led to any resolution of the problem, then:

1. The student shall have the option of making a formal written appeal to the assistant dean of the SJMC. The appeal must specify the remedy desired by the student, and it must be submitted within 45 days of the end of the academic term in which the course was taken.
2. The assistant dean will meet with the student and with the faculty member who taught the course. The instructor will be asked to submit a formal, written response to the student's written appeal. If the assistant dean is unable to broker a solution mutually acceptable to both student and instructor, then:
  - a. The dean shall appoint an ad hoc Student Ethics committee, which will review the dispute. The committee shall consist of two impartial faculty members competent in the subject matter of the course in question. The assistant dean will chair the committee and provide the committee with the student's written appeal and the written response from the faculty member.
3. Within 45 days, the committee will submit a report and recommendation to the dean, and the dean will recommend to the instructor either 1) that the originally assigned grade stand; or 2) that a new grade be assigned.
4. In cases where a change of grade is recommended and the instructor does not wish to accept the recommendation of his/her colleagues, the dean shall make the final decision.

## Admission and Enrollment Policies

### Requirements for Admission

Students who intend to apply to the school complete their freshman year of undergraduate work (a minimum of 30 semester hours) typically in the College of Arts Sciences as prejournalism and mass communication majors. Students may be eligible to apply to the school during the second semester of their freshman year for admission as sophomores to one of the five sequences. See Undergraduate Admission in the General Information section for admission standards for transfer students.

### Prejournalism and Mass Communication

Prejournalism and mass communication students are enrolled in the College of Arts and Sciences until they are eligible to transfer into the School of Journalism and Mass Communication, which normally occurs at the end of the freshman or sophomore year. They must have completed or be working toward completing 30 semester hours with a GPA of at least 2.250, based on a minimum of 12 credit hours. These students should consult with advisors in the school.

Before they can apply for admission to the school, prejournalism and mass communication majors must make satisfactory progress in courses that meet the core areas of study requirements in the College of Arts and Sciences. Students must complete or have in progress two journalism classes (JOUR 1001 and either JOUR 2403 or 2601) with a GPA of at least 2.500 before applying.

Students wishing to apply to the School of Journalism and Mass Communication must fill out an intrauniversity transfer (IUT) form and a letter of application by October 1 for spring admission or February 20 for fall admission. Students must indicate the sequence in which they wish to enroll. Meeting these minimum requirements does not guarantee a student admission to the school.

### Transfer Students

Students applying to transfer into the School of Journalism and Mass Communication from another institution must have 30 semester hours of college credit and must have completed the equivalent of the two introductory courses in journalism with a GPA of at least 3.000, both overall and in journalism courses, before they apply. Students without 30 hours of credit should apply to the College of Arts and Sciences' prejournalism major. See Undergraduate Admission in the General Information section for transfer student admission standards.

### Attendance Regulations

Students are expected to attend classes regularly and to comply with the attendance regulations specified by their instructors at the beginning of each semester. A student who does not attend any of the first week's sessions of a class during a term may be dropped from the class.

### Credit Policies

#### Pass/Fail

In addition to the university's general policies, majors in the School of Journalism and Mass Communication may not take any MAPS, arts and sciences core requirements, certificate or minor courses, business, or journalism and mass communication courses *pass/fail*, but any other course may be taken *pass/fail*. Up to 16 hours of nonjournalism courses may be taken *pass/fail*, except for transfer students, for whom the limit is one hour

in every eight attempted at the University of Colorado. Only 6 hours of *pass/fail* may be taken in any one semester.

### Transfer Credits

Credit in subjects transferred from other institutions to the University of Colorado is limited to the amount of credit given for similar work at the University of Colorado. Transfer credits in journalism and mass communication courses are limited to 12 semester credits from four-year institutions and 6 semester credits from two-year institutions. All transfer credit is subject to approval of the dean of the school. For additional information on transfer of credit policies, please see the Transfer of College-Level Credit section.

### Residence Requirement

A candidate for a degree from the School of Journalism and Mass Communication must earn the last 30 hours in residence at the University of Colorado. This may include courses taken on the Boulder, Denver, or Colorado Springs campus.

### Senior Requirement

Seniors must file a diploma card with the school by October 15 for May and August graduation and March 1 for December graduation. Diploma cards are available at the office of the School of Journalism and Mass Communication. These students must also meet with the assistant dean or the coordinator of student services the semester prior to graduation to complete the graduation check-out form.

### Withdrawal

Students may withdraw at any time prior to the start of the final examination period. Students are encouraged to consider the Time Out Program when their withdrawal from the university is temporary.

### Advising

Majors are encouraged to consult an advisor each registration period. Advising is available from faculty and staff throughout the academic year, and major advising sheets are provided for each sequence. However, students are ultimately responsible for fulfilling all degree requirements.

### Requirements for Graduation

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours is required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work, which will include all the arts and sciences core except the upper-division written core. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study.

### Double-Degree Programs

Students may complete requirements in two fields and receive two degrees from the university. Such double-degree programs are available combining journalism and mass communication with business, music, or disciplines in the College of Arts and Sciences. The double degree between Journalism and Mass Communication and Arts and Sciences requires 145 hours. All other double degrees require 150 hours. Students must make application for a double-degree program in both the School of Journalism and Mass Communication and the Leeds School of Business, the College of Arts and Sciences, or the College of

Music. Any other combined program must be arranged by consulting both schools or colleges.

## Sequences

### Advertising

The advertising major prepares students for successful careers with advertisers, ad agencies, and the media. With courses in areas such as branding, media, consumer insight, creative concepts, art direction, and portfolio development, the curriculum focuses on the two areas advertisers and their agencies value most—strategic thinking and creativity. That is why CU graduates are sought after and hired not only by Colorado agencies but by such top national agencies as Wieden + Kennedy, BBDO, Leo Burnett, Ogilvy & Mather, R/GA, Cliff Freeman, and BBH.

Students intern year-round at Crispin Porter + Bogusky in Boulder. Both faculty and adjuncts bring extensive experience and important advertising contacts to campus. Recent guests have included Lee Clow, chairman and chief creative director of TBWA\Worldwide; Alex Bogusky, co-chairman of Crispin Porter + Bogusky; and the award-winning copywriter and alum who created the Las Vegas ad, “What happens in Vegas stays in Vegas.” Advertising students in the school’s creative track have consistently taken home more awards than those at any university in the One Show College Competition. The One Show, sponsored by New York City’s One Club, is the premier international creative competition with divisions for both students and professionals.

### Course Requirements for Advertising Majors

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

#### Journalism Core Requirements (12 hours)

JOUR 1001 Contemporary Mass Media . . . . .	3
JOUR 2403 Principles of Advertising . . . . .	3
JOUR 4651 Mass Communication Law (junior standing prerequisite) . . . . .	3
One upper-division conceptual course . . . . .	3

#### Advertising Requirements (16 hours)

JOUR 3403 Branding and Positioning (JOUR 2403 prerequisite) . . . . .	3
JOUR 3453 Introduction to Creative Concepts (JOUR 2403 prerequisite) . . . . .	3
JOUR 3463 Advertising Media (JOUR 3403 and 3453 prerequisites) or JOUR 3503 Intermediate Creative (JOUR 3403 and 3453 prerequisites) . . . . .	3
JOUR 4403 Campaigns (JOUR 3463 or 3503 prerequisites) . . . . .	4
JOUR 4931 Internship (JOUR 3453 or 3463 prerequisite) . . . . .	3

#### Journalism Electives (maximum of 12 hours)

##### Additional Requirements (10 hours)

ECON 1000 Introduction to Economics or ECON 2010 Principles of Microeconomics . . . . .	4
BCOR 2400 Fundamentals of Marketing . . . . .	3
MKTG 3250 Buyer Behavior . . . . .	3

### Broadcast News

The broadcast news sequence prepares students for careers as news producers, reporters, photographers, editors, and writers for radio and television news organizations and cable TV

systems. The curriculum covers several aspects of broadcast journalism, including broadcast news writing, videography and editing, television reporting, and producing and mass communication law. Students produce and anchor live newscasts twice a week and have won regional Emmys for their work. Many students intern at major market network affiliates. Students regularly win nationally competitive internships, and some have recently interned at ABC, CBS, CNBC, CNN, Fox Sports, MTV, NBC, MSNBC, PBS, and for *Inside Edition* and Bloomberg.

### Course Requirements for Broadcast News Majors

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

#### Journalism Core Requirements (12 hours)

JOUR 1001 Contemporary Mass Media . . . . .	3
JOUR 2601 Principles of Journalism . . . . .	3
JOUR 4651 Mass Communication Law (junior standing prerequisite) . . . . .	3
One upper-division conceptual course . . . . .	3

#### Broadcast News Requirements (12 hours)

JOUR 3604 Radio and Television News (JOUR 2601 prerequisite) . . . . .	3
JOUR 3644 Principles of Production (JOUR 2601 prerequisite) . . . . .	3
JOUR 4354 TV Reporting (JOUR 3604, JOUR 3644 prerequisites) . . . . .	3
JOUR 4624 <i>NewsTeam</i> (JOUR 4354 prerequisite) . . . . .	3

#### Electives and Internships (4–16 hours)

JOUR 4931 Internship (JOUR 3604, JOUR 3644 prerequisites) . . . . .	1-3
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### Broadcast Production

The broadcast production sequence prepares students for production careers in radio, television, cable, private industry, and independent firms, including positions in programming, advertising, promotion, and management. The curriculum includes broadcast news writing, broadcast production principles, mass communication law, and advanced television production. Students direct and handle production duties for a live newscast twice a week and broadcast a weekly sports magazine. Many intern at Denver network affiliates and production facilities, including those of local professional sports teams. Students cover many collegiate sporting events on campus, where they produce, direct, and host programs, for which they have won numerous local and regional Emmy awards. Students intern at national news and entertainment organizations including Warren Miller Entertainment in Boulder, High Noon Entertainment in Denver, ESPN, Fox Sports, MTV, Sony Pictures Television, and *Entertainment Tonight*.

### Course Requirements for Broadcast Production Majors

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

**Journalism Core Requirements (12 hours)**

JOUR 1001-3 Contemporary Mass Media . . . . .	3
JOUR 2601-3 Principles of Journalism . . . . .	3
JOUR 4651-3 Mass Communication Law (junior standing) . . . . .	3
One upper-division conceptual course . . . . .	3

**Broadcast Production Requirements (12 hours)**

JOUR 3604 Radio and Television News (JOUR 2601, junior standing prerequisites) . . . . .	3
JOUR 3644 Principles of Production (JOUR 2601, junior standing prerequisites) . . . . .	3
JOUR 3674 TV Production 2 (JOUR 3644 prerequisite) . . . . .	3
Plus an additional upper-division conceptual course . . . . .	3

**Journalism Electives and Internships (4–16 hours)**

JOUR 4931 Internship (JOUR 3644 prerequisite) . . . . .	1-3
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**Media Studies**

The media studies major prepares students for careers as analysts, evaluators, and producers of media messages and policies in government and private industry and for graduate education in the social sciences, humanities, and law. The curriculum covers courses in media, history, law, policy, institutions, industries, and culture. Students may gain practical experience by taking media practice courses and at campus media such as KVCU-AM, the *CU Sports Magazine* weekly television broadcast, as well as through internships. In recent years, media studies majors have interned at the Discovery Channel, Bravo, *Late Night with Conan O'Brien*, *The Financial Times*, Rocky Mountain Planned Parenthood, Kenney Marketing and Advertising, Ogilvy Public Relations Worldwide, *Aspen Magazine*, Boulder County AIDS Project, and KCNC-TV Community Affairs.

**Course Requirements for Media Studies**

A total of 120 credit hours with a minimum of 30 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

**Journalism Core Requirements (12 hours)**

JOUR 1001 Contemporary Mass Media . . . . .	3
JOUR 2403 Principles of Advertising or 2601 Principles of Journalism . . . . .	3
JOUR 4651 Media Communication Law . . . . .	3
One upper-division conceptual course . . . . .	3

**Media Studies Core Requirements (6 hours)**

JOUR 4301 Media Ethics . . . . .	3
JOUR 4321 Media Institutions and Economics . . . . .	3

**Media Theory Requirements (6–9 hours)**

JOUR 2403 Principles of Advertising . . . . .	3
JOUR 3771 Mass Media History . . . . .	3
JOUR 4201 International Mass Communication . . . . .	3
JOUR 4331 Women and Popular Culture . . . . .	3
JOUR 4453 Advertising and Society . . . . .	3
JOUR 4711 Mass Communication and Culture . . . . .	3
JOUR 4874 The Meaning of IT (Information Technology) . . . . .	3
JOUR 4871 Special Topics (conceptual only) . . . . .	3

**Media Practice (0–3 hours)**

Students are strongly encouraged to take ONE of the following:	
JOUR 3102 Press Photography . . . . .	3
JOUR 3453-3 Advertising Copy and Layout (JOUR 2403 prerequisite and instructor permission) . . . . .	3
JOUR 3473 Advertising Research (JOUR 2403 prerequisite and instructor permission) . . . . .	3
JOUR 3614 Radio Programming and Production . . . . .	3
JOUR 4102 Advanced Photography (JOUR 3102 prerequisite) . . . . .	3
JOUR 4272 Public Relations . . . . .	3
JOUR 4282 Public Relations Programs (JOUR 4272 prerequisite) . . . . .	3
JOUR 4562 Electronic Journalism . . . . .	3
JOUR 4802 Editorial and Opinion Writing (instructor permission prerequisite) . . . . .	3
JOUR 4802 Magazine Writing (instructor permission prerequisite) . . . . .	3
JOUR 4831 Publication Design and Production . . . . .	3
JOUR 4872 Digital Newsroom . . . . .	3
JOUR 4873 Motion Design (instructor permission prerequisite) . . . . .	3
JOUR 4873 Experience Design Workshop (instructor permission prerequisite) . . . . .	3

**Journalism Electives and Internships (1–13 hours)**

Any JOUR course, including those listed above under Media Theory and Media Practice will fulfill the elective category. Media Studies majors who wish to gain practical experience are also strongly encouraged to do an internship (JOUR 4931, 1–3 hours) and/or to work for a semester or more for one of the campus media: *Campus Press* (JOUR 3902, 1–3 hours; instructor permission prerequisite); KVCU radio; *Sports Mag*; or *Cultural Currents*. For internships offered through news-editorial, broadcast, or advertising, students will need to take additional prerequisites (see major sheet for each sequence's requirements).

**News-Editorial**

The news-editorial major prepares students for careers as reporters, editors, and photographers for newspapers, websites, news services, magazines, trade and technical publications, company publications, the government, and public relations firms. Beyond required courses in the principles of journalism, reporting, editing, and media law, students may choose electives ranging from photography and magazine writing to the digital newsroom and legislative reporting. Photo students have repeatedly placed nationally in the Hearst Journalism Awards Program. News-editorial students regularly obtain internships through national programs including the Dow Jones Newspaper Fund, the Politics & Journalism Semester in Washington, D.C., the Scripps Howard Foundation, and the Chips Quinn Scholars minority internship program. Others recently interned at The Associate Press, *USA TODAY*, *Huffington Post*, *Smithsonian Magazine*, *MLB.com*, *People* magazine, *Rolling Stone*, *The New York Times*, *The Wall Street Journal*, *National Geographic*, and *Sports Illustrated*. Students intern year-round at Boulder outdoor recreation and healthy lifestyle magazines including *SKI*, *Skiing*, *Freeskier*, *Backpacker*, *VeloNews*, *Climbing*, and *Women's Adventure*.

**Course Requirements for News-Editorial Majors**

A total of 120 credit hours with a minimum of 28 hours in journalism and 80 nonjournalism hours are required for graduation. Sixty-five of the 80 nonjournalism hours must be in arts and sciences course work. Forty of the 120 credit hours must be upper-division. Within the 80 credit hours of nonjournalism course work, 12 credit hours must be upper-division hours concentrated in a single area of study. The last 30 hours toward the degree must be taken after admission to the school.

**Journalism Core Requirements (12 hours)**

JOUR 1001 Contemporary Mass Media . . . . .	3
JOUR 2601 Principles of Journalism. . . . .	3
JOUR 4651 Mass Communication Law (junior standing) . . . . .	3
One upper-division conceptual course . . . . .	3

**News-Editorial Requirements (12 hours)**

JOUR 3001 Public Affairs Reporting (JOUR 2601 prerequisite). . . . .	3
JOUR 3552 News Editing (JOUR 3001 prerequisite). . . . .	3
JOUR 4002 Reporting 2 (JOUR 3001 prerequisite) . . . . .	3
JOUR 4502 Reporting 3 (JOUR 3552, JOUR 4002 prerequisites) . . . . .	3

**Journalism Electives and Internships (4–16 hours)**

JOUR 4931 Internship (JOUR 3001, JOUR 3552 prerequisites) . . . . .	1-3
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**Graduate Programs****Master's Degrees**

More than 70 students are earning master of arts degrees at the School of Journalism and Mass Communication in two degree programs: newsgathering and mass communication research.

***Newsgathering***

The newsgathering option is designed for students with limited academic or professional experience in news reporting and writing. It prepares students to work in a wide variety of professional settings including newspapers and magazines, broadcast and cable media outlets, online publishing, and corporate communications. Students in the newsgathering program select an emphasis in print, broadcast or a combination. Newsgathering students complete internships at radio, television, and award-winning daily newspapers along Colorado's Front Range. The program culminates with a professional project. Students complete a minimum of 36 graduate semester hours and should be able to finish the degree in two years.

***Mass Communication Research***

The mass communication research option offers an opportunity for critical reflection on contemporary media structures, performance, policy, and practice. It provides graduate-level study in communication theory, research methods and relevant realms of culture, law, history, politics, and ethics. The research track is designed for students interested in an in-depth study of media or for those who wish to enhance an undergraduate or professional media background. The program is especially recommended for students desiring to continue their studies toward a PhD and for professionals seeking to teach at the college level or develop an area of reporting specialization. Total required hours: 33. Prerequisites: None, unless students wish to update their knowledge in specific areas or lack background in the course of study they choose to pursue.

***Interdisciplinary Graduate Certificate Program in Environmental Policy***

In collaboration with the university's Interdisciplinary Graduate Certificate Program in Environmental Policy, the school offers students the opportunity to earn both the master's degree in journalism, with an emphasis in environmental journalism, and the Certificate in Environmental Policy. The time to complete the degree and the certificate is estimated to be about two years.

***Deadlines for Master's Programs***

The domestic application deadline is February 1. International applications must be submitted by December 1. Applications received after February 1 will be considered on a space-available basis.

**Doctoral Degree in Communication**

The PhD in communication offered by the School of Journalism and Mass Communication is dedicated to interdisciplinary inquiry into the social, political, economic, and cultural dimensions of media, nationally and internationally, historically and in contemporary societies.

Because of the centrality of communication and media in social and individual life, media theory and research draw from a wide range of fields and disciplines, including political science, sociology, cultural studies, philosophy, history, linguistics, economics, anthropology, business, psychology, literature, law and public policy. The interdisciplinary nature of media studies is reflected in the research interests of the graduate faculty and in the curriculum, in which students take a significant portion of their course work outside the school and receive training in both qualitative and quantitative research methods. In general, the curriculum within the school focuses on the following areas: the range of theories, disciplines, and methodological approaches that have contributed centrally to the field of media studies; the institutional and cultural sources of meaning; the history and development of media industries and systems; and the relationship of media to other social institutions.

Doctoral students in the media studies program must take 42 hours of course work, pass the written and oral comprehensive examinations at the conclusion of course work, and prepare and defend a dissertation. The course work includes a two-semester Proseminar (6 hours), which is required of all first-year doctoral students in the program; 15–18 hours of electives within the school; 12–15 hours of electives taken outside the school; and 6 hours of methods (the qualitative and quantitative methods courses offered within the school).

Applicants to the PhD program in media studies are expected to hold the master's degree or equivalent graduate work. In exceptional cases, applicants without a master's degree may be considered for admittance.

***Deadlines for Doctoral Programs***

The domestic application deadline is January 1. International applications must be submitted by December 1. Applications received by the school after January 1 will not be considered.

**Financial Support****Master's Degree**

A few graduate assistantships are available. Applicants who wish to be considered should submit a resume and letter that includes detailed professional or academic qualifications by February 1 to the director of graduate studies at the School of Journalism and Mass Communication. Applicants are chosen based on experience and the specific skills needed for available assistantships each semester.

**Doctoral Degree**

Admitted PhD students are awarded graduate assistantships including a tuition waiver and stipend.



## Faculty— School of Journalism and Mass Communication

School faculty members have major-market experience in TV, radio, newspaper, magazine, and advertising. Among the faculty are leading researchers on communication policy; technology and social change; media, religion and culture; marketing and visual communication; international media development; audience behavior; and mass media law.

PAUL S. VOAKES, dean; professor. BA, University of California, Davis; MJ, University of California, Berkeley; PhD, University of Wisconsin–Madison.

LEN ACKLAND, associate professor. BA, University of Colorado; MA, Johns Hopkins School of Advanced International Studies.

JOANNE EASLEY ARNOLD, professor emerita.

SHU-LING C. BERGGREEN, associate professor. BA, Fu-Zen University; MS, Southern Illinois University; PhD, University of Tennessee.

P. DELBERT BRINKMAN, dean emeritus and professor emeritus.

ANDREW CALABRESE, associate dean; professor. BA, Denison University; MA, PhD, Ohio State University.

DESERAI CROW, assistant professor. BS, University of Colorado at Boulder; MPA, University of Colorado Denver; PhD, Duke University.

MELINDA KIGER CHEVAL, senior instructor. BS, West Virginia University School of Journalism.

PAUL DAUGHERTY, instructor. BA, MA, University of Colorado at Boulder.

THOMAS R. DUNCAN, professor emeritus.

NABIL ECHCHAIBI, assistant professor. BA, Mohammed V University, Morocco; MA, PhD, Indiana University, Bloomington.

SANDRA FISH, instructor. BS, MA, Iowa State University.

KENDRA L. GALE, assistant professor. BA, St. Olaf College; MA, PhD, University of Minnesota School of Journalism and Mass Communication.

STEWART HOOVER, professor. BA, McPherson College; MA, PhD, University of Pennsylvania.

STEPHEN B. JONES, assistant dean; senior instructor. BA, MA, West Virginia University; PhD, University of Utah.

FRANK L. KAPLAN, professor emeritus.

HUN SHIK KIM, assistant professor. BA, Chung-Ang University; MA, PhD, University of Missouri.

SAM KUCZUN, professor emeritus.

KELTY LOGAN, assistant professor. BA, University of California, Los Angeles; MBA, Tulane University; PhD, University of Texas at Austin.

MICHAEL J. McDEVITT, associate professor. AB, University of California, Berkeley; MA, San Jose State University; PhD, Stanford University.

POLLY E. McLEAN, associate professor. BA, Richmond College, City University of New York; MS, Columbia University; PhD, University of Texas.

BELLA MODY, James de Castro Chair in Global Media Studies; professor. BA, St. Xavier's College, Ranchi University, India; MA Communication, University of Pennsylvania; PhD, Gujarat University, India.

SANDRA E. MORIARTY, professor emerita.

MARGUERITE J. MORITZ, UNESCO chair; professor. BS, MS, PhD, Northwestern University.

MAURA TROESTER NUÑEZ, assistant professor. BA, University of Michigan–Ann Arbor; Diplome de Langue Francaise (Troisieme Degree), Alliance Francaise, Paris; PhD, University of Wisconsin–Madison.

JANICE A. PECK, associate professor. BA, University of Utah; MA, University of Washington; PhD, Simon Fraser University.

PATRICIA RAYBON, professor emerita.

ROBERT B. RHODE, professor emeritus.

BRETT ROBBS, associate professor. BA, Rhodes College; MA, PhD, Vanderbilt University.

WILLARD D. ROWLAND, JR., dean emeritus and professor emeritus.

JAMES SHEELER, scholar-in-residence. BA, Colorado State University. MA, University of Colorado at Boulder.

ELIZABETH A. SKEWES, associate professor. BA, University of California, Los Angeles; MA, Ohio State University; PhD, Syracuse University.

DAVID SLAYDEN, associate professor. BA, Southern Illinois University; MA, University of Chicago; PhD, Indiana University.

RICK STEVENS, assistant professor. BS, Abilene Christian University; PhD, University of Texas.

MICHAEL TRACEY, professor. BA, University of Exeter; PhD, University of Leicester.

ROBERT TRAGER, professor. BA, San Francisco State College; MA, PhD, University of Minnesota; JD, Stanford University.

JAN WHITT, professor. BA, MA, Baylor University; PhD, University of Denver.

THOMAS YULSMAN, associate professor. BA, Harpur College, State University of New York at Binghamton; MS, Columbia University Graduate School of Journalism.

# Law School

*David H. Getches, dean*

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school website: [www.colorado.edu/law](http://www.colorado.edu/law)

**T**HE UNIVERSITY OF COLORADO LAW SCHOOL, established in 1892, has a long and proud history as a top public law school. The first students of color entered in 1898. The school became a charter member of the Association of American Law Schools organized in 1901. The first woman graduated in 1908. And, the school has been on the American Bar Association's list of accredited law schools since its first publication in 1923.

Today, Colorado Law, housed in the beautiful new "green" Wolf Law Building with one of the largest law libraries in the country, is also one of the most technologically advanced law schools in the country. Most importantly, it provides one of the best comprehensive legal educations in the nation, featuring:

- 530 students, selected from the nation's statistically best applicants with diverse backgrounds and representing 100 undergraduate institutions
- A favorable faculty-student ratio (1:12.5) that produces class sizes that encourage discussion
- 60 highly published resident faculty dedicated to interacting with students inside and outside the classroom
- First-year students who are placed in small sections for more class participation opportunities and to build relationships with classmates and professors
- Full-time, three-year Juris Doctor degree only, with eight dual degrees, four certificates, four centers, and three journals focused on areas of strength
- A new Experiential Learning Program that integrates lawyering activities, including nine legal clinics, externships, public service pledge, and trial and court competitions
- Comprehensive program to prepare students for any career; a quarter of graduates obtain judicial clerkships
- Impressively high first-time bar passage rate, especially compared to the state average

## Law School Vision

A supportive and diverse community of scholars and students in a place that inspires vigorous pursuit of ideas, critical analysis, and civic engagement in order to advance the rule of law in an open, sustainable society.

### Our Mission

- **Teaching:** To employ robust theoretical inquiry, doctrinal and policy analysis, and professional skills.
- **Scholarship:** To explore and discuss ideas, to develop and test new ideas and approaches, to challenge the status quo, and



to convey the school's research and ideas to lawyers, academics, policymakers, and the world.

- **Public Service:** To instill in students an awareness of a lawyer's civic responsibilities and opportunities to serve and lead.

## Wolf Law Building

The five-story Wolf Law Building was completed in 2006 and was only possible through the financing of alumni, friends, law firms, and 61 percent by students.

- Top "green" certification, from construction to operation, including 88 percent renewable energy and electricity, 40 percent water use reduction, and 59 percent regionally manufactured materials
- Technologically advanced wireless networking, video conferencing, videotaping capabilities for distance learning, and digital kiosks
- All classrooms have electrical outlets for each student and complete audio-visual equipment (LCD projectors, DVD, VHS, cable) with built-in touch-screen control systems
- Student commons with café and patio, study and interview rooms, individual lockers and mailboxes, law bookstore, and courtyard with barbeque
- Suites and offices for centers, clinics, student organizations, journals, and all faculty offices
- 250-seat main courtroom with judge's chambers, 30-seat teaching courtroom with jury box and witness stand, and a mock trial practice room for competition and clinic training

The three-story William A. Wise Law Library is housed in the Wolf Law Building.

- Most comprehensive law library in the 12-state Rocky Mountain region, one of the largest in the country, serving as a selective federal government depository
- 40 instructional student lab computers, five group study rooms, 445 seats, distributed computing stations
- 25,000 visitors served per year
- 690,000 volumes and microform equivalents

## Academics

Colorado Law's three-year full-time Juris Doctor (JD) degree provides a strong, well-rounded legal education with a rich mixture of theory, policy, doctrinal analysis, and professional skills.

Students have broad flexibility to meet their individual interests and needs.

### Areas of Academic Strength

- **Environmental, Energy, and Natural Resources Law.** Ranked consistently among the very best in the country, environmental and natural resources law has been a key focus of the Colorado Law curriculum for more than half a century, and is one of the strongest and deepest programs of its kind.
- **Technology, Entrepreneurial, and Intellectual Property Law.** Boulder is the heart of one of the nation's premier telecommunications and technology hubs, and boasts a vibrant entrepreneurial community, ranking it No. 1 by Federal Reserve Bank of Boston researchers as the highest performing small city for venture capital investment.
- **American Indian Law.** With more than 30,000 American Indians living within a 30-mile radius of the CU-Boulder campus, Colorado Law is in the "Hub of Indian Country," which is why Boulder is home to the Native American Rights Fund.
- **Juvenile and Family Law Program.** With U.S. state trial courts reporting nearly 5 million cases involving domestic relations, there is an increased demand for trained lawyers and advocates who have acquired an interdisciplinary specialization in resolving family issues.

### Certificates

Certificate programs allow students to add a law specialty to their JD degree. Students must earn 6 credit hours beyond the JD requirements, which can be completed within the normal three years.

- American Indian Law
- Entrepreneurial Law
- Juvenile and Family Law
- Tax Emphasis Program
- Graduate Certificate Program in Environment, Policy, and Society (through CU's Environmental Studies Program)

### Dual Degree Programs

Colorado Law students take advantage of an array of rich opportunities for interdisciplinary study through other CU schools and colleges, in addition to the University of Alberta. The schools work in cooperation to select courses for the programs that allow students to earn the dual degrees in less time than it takes to earn each degree separately. Students apply separately to and are admitted by the two schools under their respective admissions requirements. Only credits earned after law school enrollment count toward the JD degree, and the first year of the JD curriculum must be taken exclusively at Colorado Law.

- Juris Doctor/Master of Business Administration (JD/MBA) with CU-Boulder's Leeds School of Business
- Juris Doctor/Master in Environmental Studies (JD/ENVS) with CU-Boulder's Environmental Studies Program
- Juris Doctor/Doctorate in Environmental Studies (JD/PhD) with CU-Boulder's Environmental Studies Program
- Juris Doctor/Doctor of Medicine (JD/MD) with UC Denver's School of Medicine on the Anschutz Medical Campus in Aurora

- Juris Doctor/Master of Public Administration (JD/MPA) with UC Denver's School of Public Affairs
- Juris Doctor/Master of Science, Telecommunications (JD/MST) with CU-Boulder's Interdisciplinary Telecommunications Program
- Juris Doctor/Master of Urban and Regional Planning (JD/MURP) with CU-Boulder's College of Architecture and Planning
- Juris Doctor/Bachelor of Laws (JD/LLB) with the University of Alberta Faculty of Law, Canada

### Study Abroad and Summer Session

While Colorado Law offers exciting but limited summer courses, it offers a variety of legal study abroad opportunities in places such as Barcelona, Dublin, Florence, London, Oxford, Paris, and Moscow/St. Petersburg. Study abroad allows students to learn about other nations' system of laws, participate in international and comparative legal studies, and approach legal systems and subjects from a non-U.S. perspective. This is a great opportunity to study with law students from other countries in the areas of international business, comparative law, European Union law, and international law.

### Legal Research and Writing

Colorado Law's Legal Research and Writing Program ensures that its graduates are proficient in legal research, analysis, and writing, and capable of adapting these skills to varying contexts. All first-year Legal Writing and Appellate Court Advocacy courses are taught by resident legal writing faculty, and legal research and research strategy is guided by professional librarian instructors. Upper-division courses are designated as writing classes and students spend a seminar preparing a substantial paper requiring significant legal research and writing.

### First Year

First-year courses lay the foundation and all JD candidates take these courses to learn to "think like a lawyer." Common law courses taught in the Socratic Method allow students to develop legal reasoning and critical thinking skills. All first-year students are assigned to a small cohort to help build strong relationships and study groups with classmates.

#### Fall Semester

Civil Procedure I: Rules governing pleading, joinder of parties, discovery, jurisdiction of courts, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal and State Rules of Civil Procedure  
Contracts: Contract liability, offer and acceptance, consideration, frauds statute, contract remedies, the parol evidence rule, contract performance, conditions, changed circumstances

Legal Writing: Legal analysis and document preparation, objective legal analysis techniques, legal rule synthesis, authority use to explain rules, and rule application to case facts

Property I: Personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls

Torts: Nonconsensual allocation of losses for civil wrongs, focusing on negligence and strict liability

#### Spring Semester

Appellate Court Advocacy: Appellate brief and document preparation, oral arguments before a three-judge mock court, techniques of persuading a court to accept a client's view of the law and facts, professional judgments within ethical boundaries, and lawyer credibility

Civil Procedure II: Same topics from Civil Procedure I

Constitutional Law: Constitutional structure, including judicial review, federalism, separation of powers, and constitutional rights of due process and equal protection

Criminal Law: Statutory and common law of crimes and defenses, the procedures by which the law makes judgments as to criminality of conduct, constitutional limits

Property II: Same topics from Property I

### *Academic Support*

From the student's first day, Colorado Law invests in her or his academic success. Through the Rothgerber Academic Assistance Program, upper-division law students tutor first-year students in any of their courses, except Legal Writing and Advocacy. The program is open to all first year students, and more than 50 percent of the class participates in this free opportunity.

### Second and Third Years

The elective program in the second and third years builds upon the foundation laid in the first-year curriculum. Students must take Evidence and Legal Ethics and Professionalism courses, a seminar course, and a legal practice course. Colorado Law encourages a balance between experiential learning and classroom studies, graded courses and non-graded courses, and study within and outside the law school.

### *Elective Courses*

#### **Alternative Dispute Resolution**

Alternative Dispute Resolution  
Arbitration  
Legal Negotiation

#### **Business**

Accounting Issues for Lawyers  
Advanced Contracts: Commercial Transactions  
Agency, Partnership, and the LLC  
Antitrust  
Bankruptcy  
Business Planning  
Business Transactions  
Corporate Finance  
Corporations  
Creditors' Remedies and Debtors' Protection  
Deals  
Humanizing Contracts  
Government Regulation of Business  
Law Practice Management  
Mergers, Acquisitions, and Reorganizations  
Payment Systems  
Quantitative Methods  
Secured Transactions  
Securities Regulation  
Sports Law  
Venture Capital and Private Equity

#### **Criminal**

Capital Punishment in America  
Comparative Criminal Procedure  
Criminal Procedure: Investigative Phase  
Criminal Procedure: Adjudicative Process  
White Collar Crime

#### **Family, Gender, and Health**

Domestic Relations  
Domestic Violence  
Family Law  
Family Law Legal Drafting in Spanish  
Gender, Law, and Public Policy  
Health Law I: Finance, Administration and Organization of Health Care  
Health Law II: Medical Malpractice Litigation

Juvenile Justice  
Legal Rights of Children  
Parent, Child, and State  
Sexuality and the Law  
Spanish for Family Law Practice

#### **Government**

Administrative Law  
Advanced Torts  
Civil Liberties Legislation  
Civil Rights Legislation  
Conflict of Laws  
Federal Courts  
Legislation  
Local Government  
Supreme Court Decision Making

#### **Intellectual Property, Technology, and Telecommunications**

Computer Crimes  
Copyright  
Introduction to Intellectual Property Law  
IP and Technology Contracting  
Patent Law  
Patent Litigation  
Privacy and Security in the Digital Age  
Standards and Standardization Wars  
Telecommunications Law and Policy  
Trademark and Unfair Competition

#### **International**

Comparative Law  
Comparative Employment Law  
Immigration and Citizenship Law  
International Business Transactions  
International Criminal Law: Theory and Practice  
International Dispute Settlement  
International Environmental Law  
International Human Rights  
International Law  
International Legal Order: History and Foundations  
Introduction to Islamic Law  
Introduction to Jewish/Israeli Law  
Refugee and Asylum Law

#### **Jurisprudence and Perspective**

Economic Analysis of Law  
Jurisprudence  
Law and the Biology of Human Nature  
Law and the Holocaust  
Law and Religion  
Law and Social Science

#### **Litigation**

Advanced Appellate Advocacy  
Complex Civil Litigation  
Evidence  
Jury Selection and History  
Litigation Drafting

#### **Natural Resources and the Environment**

American Indian Law I  
American Indian Law II  
Climate Change Law and Policy  
Energy Insecurity and Sustainable Law  
Energy Law and Regulation  
Environmental Enforcement  
Environmental Law  
Environmental Litigation  
Foundations of Natural Resources Law and Policy  
Jurisdiction in Indian Country  
Law, Science, and Policy of a Changing Climate  
Mining and Energy Law

Oil and Gas  
Public Land Law  
Toxic and Hazardous Waste  
Water Law

#### Practice—Clinical

American Indian Law Clinic  
Appellate Advocacy Clinic  
Civil Practice Clinic  
Criminal Defense Clinic  
Entrepreneurial Law Clinic  
Extern Program  
Juvenile Law Clinic  
Natural Resources Litigation Clinic  
Technology Law and Policy Clinic  
Wrongful Convictions Clinic

#### Practice—Simulation

Advanced Trial Advocacy  
Appellate Advocacy Competition  
Arbitration  
International Moot Court Competition  
Mediation  
Motions Advocacy  
Rothgerber Moot Court Competition  
Trial Advocacy  
Trial Competition

#### Property

Construction Law  
Land Conservation Law  
Land Use Planning  
Real Estate Planning  
Real Estate Transactions  
Wills and Trusts

#### Public Interest

Education Law  
Election Law  
Employment Discrimination  
Employment Law  
First Amendment  
Labor Law  
Lawyers for Social Change  
Poverty Law  
Race and American Law  
Remedies

#### Research and Writing

Advanced Legal Research  
Advanced Legal Writing  
Creative Writing for Lawyers  
Independent Legal Research: *Journal of International Environmental Law and Policy*  
Independent Legal Research: *Journal on Telecommunications & High Technology Law*  
Independent Legal Research: *Law Review*  
Judicial Opinion Writing

#### Taxation

Corporate Taxation  
Estate Planning  
Federal Estate and Gift Tax  
Federal Tax Politics  
Income Taxation  
International Taxation  
Taxation of Conduit Entities

#### Seminars

Advanced American Indian Law  
Advanced Constitutional Law Equality and Privacy

Advanced Constitutional Law, Theory, and Practice of Free Speech in the United States  
Advanced Criminal Procedure  
Advanced Natural Resources Law  
Advanced Topics in Federalism  
Advanced Topics in Health Law and Policy  
Advanced Torts  
Affordable Housing  
Antidiscrimination and First Amendment  
Bioethics and Law  
Cities, Suburbs, and the Law  
Civil Liberties Litigation  
Class and Law  
Comparative Constitutional Law  
Comparative Public Health Law and Ethics  
Computers and the Law  
Constitutional Foundations: Core Ideas  
Constitutional Theory  
Consumer Empowerment  
Counseling Families in Business  
Gender Law  
Higher Education Policy  
Information Privacy  
International Crimes and Punishment  
Jurisprudence  
Law and Economics of Utility Regulation  
Law and Literature  
Media, Popular Culture, and Law  
Modern Legal Theory  
Modern Legal Theory: Core Ideas  
Oil and International Relations  
Power, Ethics, and Professionalism  
Public Health Law and Ethics  
Securities Litigation and Enforcement  
Separation of Powers  
Tax Policy  
Theory of Punishment

Note: Not all courses are offered each semester. This is a composite list of the last three years of course offerings.

## Experiential Learning

Experiential education encompasses lawyering activities in which students receive experience outside the classroom—clinics, externships, appellate and trial competitions, and voluntary public service work. Colorado Law's Experiential Learning Program gives greater coherence to our entire curriculum and builds linkages with faculty involved in experiential education and those involved in traditional classroom teaching.

## Legal Clinics

Colorado Law's Clinical Education Program started in 1948 and now serves almost 900 clients each year. Clinics are courses that provide practical learning experiences for our students, much-needed assistance to those less fortunate in our community, and invaluable service to the public good. By handling actual cases, students make the transition from legal theory to legal practice, enabling them to take classroom knowledge and turn it into real-world understanding. Under the supervision of expert clinical faculty, student practitioners take primary responsibility for understanding the goals of their clients, and working to represent those clients' interests persuasively and competently. Clinics are available to all interested students.

- American Indian Law Clinic
- Appellate Advocacy Clinic

- Civil Practice Clinic
- Criminal Defense Clinic
- Entrepreneurial Law Clinic
- Juvenile Law Clinic
- Natural Resources Litigation Clinic
- Technology Law and Policy Clinic
- Wrongful Convictions Clinic

### Public Service Pledge Program

Colorado Law is a public institution with a public spirit. The faculty and the students have a passion and deep appreciation of a lawyer's civic responsibilities to serve the underprivileged and the community. Students who complete a voluntary pledge of at least 50 hours of law-related public service work, not for credit or other compensation, receive recognition on their transcripts. Such service provides students with valuable skills and values, such as legal research and writing, client interviewing, and legal argument development. Students can perform pro bono work for any government agency engaged in legal work (administrative agencies, public defenders, district attorney offices, and judiciary), nonprofit that provides legal services, public interest law firm, or private firm with pro bono projects.

### Trial Advocacy and Moot Court

Appellate advocacy, mock trials, and moot court competitions help to develop skills in appellate brief writing and oral argument, and gain valuable trial practice experience. Colorado Law teams have consistently been extremely competitive and participate in and host more competitions each year. Coaching and support come from an experienced group of faculty, fellow students, alumni who recently competed, and judges and lawyers in the community. Students may earn academic credit for their participation.

Constance Baker Motley National Moot Court Competition  
 Emory Civil Rights and Liberties Competition  
 Hispanic National Bar Association Moot Court  
 Jessup International Law Moot Court Competition  
 Jim R. Carrigan Trial Advocacy Competition  
 Mardi Gras National Moot Court Competition  
 National Moot Court Competition  
 National Moot Court Competition in Child Welfare and Adoption Law  
 National Student Trial Advocacy Competition  
 National Telecommunications Moot Court Competition  
 The National Trial Competition  
 Native American Law Students Association Moot Court Competition  
 Pace National Environmental Law Moot Court Competition  
 Philip C. Jessup International Law Moot Court Competition:  
 The Rothgerber Moot Court Competition  
 Saul Lefkowitz National Moot Court Competition

### Externships

Students may gain academic credit for performing substantive legal work with government agencies, public interest institutions, private non-profits, and other private-sector employers such as a law firms. Students develop professional lawyering skills, gain insight into various aspects of the legal system and profession, and cultivate a sense of professional responsibility. While uncompensated, students receive credit hours (1 credit hour per 50 hours of work) toward their degrees.

## Research Centers

Colorado Law's centers have earned national prominence for their research, publications, and leading conferences that debate legal and policy issues, foster practical solutions and innovative ideas, facilitate networking, and produce scholarship. Students are an integral part of the centers. Students may work as volunteers, externs, or research assistants on research projects, reports, newsletters, and events. In addition, students will have unique access to national and local policymakers, researchers, scientists, entrepreneurs, and legal practitioners in many areas of the law.

- **Byron R. White Center for the Study of American Constitutional Law.** Named in honor of the retired Supreme Court Justice and CU alumnus, the center was founded in 1990 to enhance the study and teaching of Constitutional law and stimulate public debate and understanding of our Constitutional system. Each year, the center gathers politicians, academics, and practitioners for the Ira C. Rothgerber, Jr. Conference. Recent topics have included home rule, reapportioning Colorado, state initiatives, academic freedom, and conscience and the free exercise of religion.
- **Center for Energy and Environmental Security.** As a nonpartisan forum, this center develops innovative ideas dealing with energy and environmental security issues through interdisciplinary research and policy. It moves beyond research to create practical real-world strategies and solutions that address local, state, national, and international issues. Major projects include EnergyPledges (a global watchdog for international sustainable energy commitments), President's Climate Action Plan, Colorado Energy Profile, Energy Justice Fuel for Life addressing indoor pollution from burning biomass for cooking and heating and new technologies, and Capital Solutions for a Sustainable Future, which is an interactive legal information website to facilitate clean-energy technology exchange between the United States and India.
- **Natural Resources Law Center.** Founded in 1982, the center promotes intellectual discourse over critical natural resources law and policy problems to foster practical and effective solutions. Research projects bring an academic focus to real-life issues and typically lead to publications that inform and influence policy-makers to promote better decisions. Major projects include The WesternWater Policy Program to assure adequate water supplies, The Red Lodge Clearinghouse website for information to solve natural resources law and policy problems, The Public Comment Project that has students draft comments and participate in public meetings and hearings, and Best Management Practices for Oil and Gas Surface Use.
- **Silicon Flatirons Center for Law, Technology, and Entrepreneurship.** The center is nationally recognized as a telecommunications law powerhouse. It hosts leading technology policy conferences with legal, technical, regulatory, and business experts to elevate the debate around technology policy issues, facilitate networking, and develop "human capital" in the Colorado technology community. Students assist on major research projects including the Software Regulation Clearing House and help organize 15–20 events a year on topics such as digital broadband migration, entrepreneurial law and startups, new technology, business plan competition, private equity, software patents, and regulatory law and economics.

## Student Life

Students who choose the University of Colorado Law School generally seek the very best all-around legal education combined with a great location, a supportive community, top specialties, interdisciplinary study, dedicated faculty, a public service tradition, and so much more. Colorado Law is distinguished by the extraordinary quality of its students. As a competitively selective school, its students rank in the top tier, represent a rich blend of geographic and ethnic backgrounds, and bring experiences of leadership, career achievement, and community service. Although competitiveness among students with such elite qualifications is typical, our students have a proud history of putting collegiality first.

### Commitment to Diversity

Colorado Law is proud to have been one of the earliest law schools in the nation to graduate lawyers of color. The first students of color entered the University of Colorado Law School in 1898 and the first woman graduated in 1908. Colorado Law's commitment to diversity is evident throughout the Law School. We seek students with not only the academic credentials to excel in a rigorous legal education program, but also a desire to join a diverse community of future lawyers committed to the service of others. Student organizations offer support and networking opportunities. For first-year students, the Office of Career Development developed a diversity mentor program and supports the Colorado Pledge to Diversity Summer Clerkship Program for summer associate positions.

### Journals

Colorado Law is home to three nationally respected student-led law journals. These journals provide legal research, writing, editorial, and publishing experience to competitively chosen second- and third-year law students, with a select number of third-year students serving as prestigious Editorial Board members. Subscribers include government agencies, judicial courts, law school and government libraries, judges, attorneys, faculty, and alumni.

- *University of Colorado Law Review* (founded in 1928)
- *Colorado Journal of International Environmental Law and Policy*
- *Journal on Telecommunications & High Technology Law*

### Student Organizations

Colorado Law's student organizations reflect the diverse interests and concerns of its active student body. Students increase their knowledge in specific areas, gain leadership experience, and work closely with fellow students, faculty, alumni, and legal professionals with similar passions. The Student Bar Association serves as the school's student government, represents the interests of law students generally, allocates funding to other organizations, and administers the school's honor code with the Honor Council.

American Bar Association, Law Student Division  
 American Civil Liberties Union  
 American Constitution Society  
 Asian Pacific American Law Students Association  
 Black Law Students Association  
 Business Law Association  
 Christian Legal Society  
 Colorado Election Law Project

Construction and Real Estate Law Association  
 Diversity Awareness Now  
 Doman Society of International Law  
 Environmental Law Society  
 Federalist Society for Law and Public Policy Studies  
 J. Reuben Clark Law Society  
 Jewish Law Students Association  
 Juvenile and Family Law Club  
 Latino Law Students Association  
 Law Students for Reproductive Justice  
 Legal Alternative Dispute Resolution Club  
 National Lawyers Guild  
 Native American Law Students Association  
 OUTlaw  
 Public Interest Students Association  
 Republican Law Society  
 Space Law  
 Sports and Entertainment Law Student Association  
 Student Bar Association  
 Student Trial Lawyers Association  
 Technology and Intellectual Property Society  
 Women's Law Caucus

### Honor System

Members of the legal profession are held to the highest standards of ethical and professional conduct, and Law School faculty and students are expected to maintain the same level of professional competence and integrity in their work. The Colorado Law School Honor Code, subscribed to by all students, is a system of rules administered by student officers and demands the highest ethical conduct. Law students have considerable individual freedom and responsibilities, such as being able to take unproctored exams.

### Career Development

Colorado Law prepares students for a wide variety of careers. The Office of Career Development offers students and alumni individualized career counseling and professional development advice to help them identify and achieve their career goals. The office has career counselors with JDs who have more than 30 years of law practice experience. It maintains state-of-the-art career development and job search resources and helps students prepare for and pursue job opportunities during and after law school.

### Services and Programs

- **Career Counseling:** Each first-year student meets with a career counselor who helps with résumés and job search action plans.
- **Employer Outreach:** Counselors conduct extensive employer outreach in- and out-of-state.
- **Career Fairs/Symposia:** The office organizes employer networking opportunities on and off campus.
- **On-Campus Interviews:** Each year, nearly 70 employers come on campus to interview students for summer clerkships, internships, and associate attorney positions with law firms and government agencies.
- **Résumé Collections:** Resumes from interested students are sent to in- and out-of-state employers.
- **Brown Bag Speaker Series:** Practicing attorneys from the local and national legal community are regularly invited to speak to students during weekly lunch-hour informational sessions about what it's like to work in a variety of legal areas.

- **Job Postings:** Through a secure web-based system, students and alumni can review current job listings and an online resources library.
- **Mock Interviews:** Counselors set up appointments with students for practice interviews with the counselors or with volunteer attorneys. Students receive tips and feedback to help them improve.
- **Referrals:** Counselors help students connect with alumni and other legal professionals as resources for information about a field or practice area of law in Colorado or any other part of the country or world.
- **Mentoring and Community Involvement:** The office regularly helps students get involved in the legal community by referring them to mentor programs, bar associations, Inns of Court, and other law-related organizations.

### Job Opportunities

Colorado Law helps students pursue numerous job opportunities and helps connect them to valuable part-time and permanent legal positions, including:

- **Externships** are for students working unpaid in the legal community for academic credit, under the supervision of a field and faculty supervisor.
- **Internships** are paid or voluntary student positions with law firms, corporations, government agencies, judges, and public interest organizations.
- **Honors programs** are prestigious programs for students and graduates to work within federal government agencies.
- **Judicial clerkships** are prestigious paid positions for new graduates working for judges in federal, state, and appellate trial courts.
- **Summer law clerks** are paid part-time or full-time for first- or second-year students in law firms and other organizations.
- **Fellowships** provide funding for law students and graduates to work with public service organizations or academic programs.

### Employment during Law School

The study of law is demanding and requires the highest level of concentration. Most students devote 50–70 hours a week to class time and study. Therefore, it is Colorado Law’s policy that students may not accept employment during the critical first two semesters. After that, students may be employed for no more than 20 hours per week when enrolled in more than 12 credit hours, in accordance with ABA Rule 304(f).

## JD Admissions and Financial Aid

### Admission Standards

Above all, Colorado Law values leadership, character, diversity, and commitment to service in its students. The small size of the Law School—about 170 in each entering class—and the large number of applicants require a very selective admissions process. Admissions decisions are based on many factors, including undergraduate grade point average (GPA) and the Law School Admissions Test (LSAT) score, and take into account other indicators of ability, motivation, and achievement as well. In the faculty’s judgment, a diverse student body improves the educational experience of all students.

### Application Process

The **Early Decision** application process is for prospective law students who know that Colorado Law is the school they wish to attend. Candidates who apply under this option are expected to enroll at Colorado Law if offered admission. Early Decision applications are accepted starting October 1, and all materials must be received by November 15 for the application to be reviewed for early decision. Early Decision applicants will receive a decision in early January. Those students who are not admitted through this process will automatically be considered again as part of the regular admission process.

**Regular admission** applications with all required materials should be submitted starting October 1 and no later than March 15. Find complete application instructions at [www.lsac.org](http://www.lsac.org) and on the Colorado Law website. The Admissions Committee considers regular decision applications beginning in December. Applicants are notified by letter of decisions from mid-January until the class is filled in May. Admission from the waitlist, which is not ranked, can occur as late as July and the number of offers varies from year to year.

### International Students

International applicants have additional requirements as explained on the school’s website, including transcripts showing completion of the equivalent of an American bachelor’s degree, foreign degree verification, and transcript translation, if applicable. The TOEFL is required of all students whose native language is not English, as a thorough and excellent command of written and spoken English is crucial to success in law school. After admissions, international students must submit a financial affidavit stating that they have the financial resources to support themselves while attending school in the United States, since the Colorado Law cannot offer loan assistance to international students.

### Transfer Students

Students who have completed at least one full year of study (approximately 30 semester credits) at a law school accredited by the American Bar Association may apply for fall transfer admission to Colorado Law. Applications for fall enrollment are accepted after May 1 and must be received by July 1. The number of transfer students admitted varies each year, and only those who have done very well in their law studies elsewhere have a substantial chance of admission.

### Visiting Students

Colorado Law admits some students who are receiving their law degree from another law school to study here for the fall or spring semester. Admission as a visiting student is available to applicants who have completed one or two years of high-quality work at another law school and have demonstrated a compelling need to attend Colorado Law. Financial aid for visiting students is usually handled by a consortium agreement between Colorado Law and the degree-granting institution.

### Financial Aid

All admission decisions are made without regard to students’ financial need. Every attempt is made to provide full financial assistance through federal and private educational loans, grants, work-study, and scholarships. Students applying for financial aid, private law scholarships, or grants based on financial need must complete the Free Application for Federal Student Aid (FAFSA, [www.fafsa.ed.gov](http://www.fafsa.ed.gov)) and submit it to the processor as soon



as possible after January 1. The priority FAFSA filing deadline is April 1. Eligible students are awarded Federal Direct Stafford/Ford Loans up to a maximum of \$20,500 per year. Graduate PLUS loans are available to students when financial need exceeds Stafford loan limits. Graduate PLUS loans are federally guaranteed, but unlike Stafford loans, they have good credit requirements for borrowers. Private alternative law loan programs have interest rates and fees that vary according to the lender, the credit rating of the student, and whether there is a co-signer. Both loan fees and interest rates may be higher than those of the Stafford Direct loans and there is no cap in interest rates.

## Scholarships, Fellowships, and Awards

A number of scholarships, fellowships, and awards are given annually on a competitive basis for academic and financial considerations. All admitted first-year students are considered for scholarships, as recipients are selected by the Admissions and Financial Aid Committee after an offer of admission has been made. It is possible for scholarships to be awarded through August. Colorado Law also offers scholarship money to second-year and third-year students each spring. These scholarships are awarded based on academic performance and other criteria, such as economic need and demonstration of assistance in advancing the diversity of the student body.

## Family Educational Rights and Privacy Act

The Family Educational Rights and Privacy Act (FERPA) affords certain rights with respect to a student's education records. Copies of the policy are available in the Wise Law Library and the Rules of the Law School on the website.

## Faculty

NORMAN F. AARONSON, clinical professor emeritus.

J. BRAD BERNTHAL, associate clinical professor. BA, University of Kansas; JD, University of Colorado.

BARBARA BINTLIFF, Nicholas Rosenbaum Professor of Law, director of the William A. Wise Law Library. BA, Central Washington State College; JD, MLL, University of Washington.

WILLIAM BOYD, associate professor. BA, University of North Carolina; MA, PhD, University of California, Berkeley; JD, Stanford University.

ALICIA BRILLON, reference librarian; instructor. BA, MLIS, University of Washington; JD, Seattle University.

GEORGIA BRISCOE, library associate director; head of technical services; instructor. BS, Washington State University; MA, University of San Diego; AMLS, University of Michigan.

HAROLD BRUFF, Charles I. Thomson Professor of Law. BA, Williams College; JD, Harvard University.

ALEXIA BRUNET MARKS, associate professor. BA, Colgate University; MS, PhD, Purdue University; JD, Northwestern University.

EMILY CALHOUN, professor. BA, MA, Texas Tech University; JD, University of Texas.

PAUL F. CAMPOS, professor. AB, MA, JD, University of Michigan.

AL CANNER, legal writing professor. BA, Brandeis University; JD, University of Colorado.

DEBORAH CANTRELL, director of clinical education; associate professor. BA, Smith College; MA, University of California, Los Angeles; JD, University of Southern California.

KRISTEN A. CARPENTER, associate professor. BA, Dartmouth College; JD, Harvard University.

VIOLETA CHAPIN, associate clinical professor. BA, Columbia University; JD, New York University.

RICHARD B. COLLINS, professor, director of the Byron R. White Center for the Study of American Constitutional Law. BA, Yale University; LLB, Harvard University.

JUSTIN DESAUTELS-STEIN, associate professor. BA, University of North Carolina; JD, University of North Carolina; LLM, Harvard University; MALD, Tufts University The Fletcher School.

CATHARINE DU BOIS, legal writing professor. BA, Indiana University; JD, Georgetown University.

ANN ENGLAND, associate clinical professor. BA, JD, University of Michigan.

MIRANDA P. FLEISCHER, associate professor. BA, Duke University; JD, University of Chicago; LLM, New York University.

VICTOR FLEISCHER, associate professor. BA, JD, Columbia University.

H. PATRICK FURMAN, clinical professor emeritus.

WAYNE M. GAZUR, professor. BS, University of Wyoming; JD, University of Colorado Law School; LLM, University of Denver College of Law.

DAVID H. GETCHES, dean; Raphael J. Moses Professor of Natural Resources Law. AB, Occidental College; JD, University of Southern California.

LAKSHMAN GURUSWAMI, Nicholas Doman Professor of International Environmental Law; director of the Center for Energy and Environmental Security. LLB, Sri Lanka; PhD (Law), University of Durham, United Kingdom.

MELISSA HART, associate professor. BA, Harvard-Radcliffe; JD, Harvard University.

CLARE HUNTINGTON, associate professor. BA, Oberlin College; JD, Columbia University.

YUMIN JIANG, technical services librarian; instructor. BE, Peking University; MA, University of Wisconsin-Madison; MS, University of Illinois, Urbana-Champaign.

DEREK H. KIERNAN-JOHNSON, legal writing professor. AB, Princeton University; JD, University of Michigan.

SARAH A. KRAKOFF, associate dean for research; associate professor. BA, Yale University; JD, University of California, Berkeley.

ROBERT LINZ, library associate director; head of Public Services; instructor. BA, Wake Forest University; JD, University of Florida; MLIS, Florida State University.

MARK J. LOEWENSTEIN, Monfort Professor of Commercial Law. AB, JD, University of Illinois.

NATALIE MACK, legal writing professor. BA, University of South Carolina; JD, University of Colorado.

DAYNA MATTHEW, associate dean for academic affairs; professor. AB, Harvard-Radcliffe; JD, University of Virginia.

SCOTT MOSS, associate professor. BA/MA, Stanford University; JD, Harvard University.

CHRISTOPHER B. MUELLER, Henry S. Lindsley Professor of Procedure and Advocacy. AB, Haverford College; JD, University of California, Berkeley.

ROBERT F. NAGEL, Ira C. Rothgerber Jr. Chair in Constitutional Law. BA, Swarthmore College; JD, Yale University.

HELEN NORTON, associate professor. BA, Stanford University; JD, University of California, Berkeley.

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SCOTT R. PEPPE, associate professor. BA, Cornell University; JD, Harvard University.

WILLIAM T. PIZZI, professor. AB, Holy Cross College; MA (Phil.), University of Massachusetts; JD, Harvard University.

CAROLYN RAMSEY, associate professor. BA, University of California, Irvine; AM, JD, Stanford University.

COLENE ROBINSON, associate clinical professor. BA, Miami University of Ohio; JD, Loyola University, Chicago.

PIERRE SCHLAG, Byron R. White Professor of Constitutional Law. BA, Yale University; JD, University of California, Los Angeles.

AMY J. SCHMITZ, associate professor. BA, Drake University; JD, University of Minnesota.

ANDREW SCHWARTZ, associate professor. ScB, Brown University; JD, Columbia University.

KAREN SELDEN, catalog librarian; instructor. BS, Pennsylvania State University; MLS, Simmons College.

ANNA SPAIN, associate professor. BA, Denison University; JD, Harvard University.

LAURA SPITZ, associate professor. BA, University of Toronto; LLB, University of British Columbia; JSD, Cornell University.

MARK SQUILLACE, director of the Natural Resources Law Center; professor. BS, Michigan State University; JD, University of Utah.

GABRIELLE MARKS STAFFORD, director of Moot Courts; legal writing professor. BA, University of Pennsylvania; JD, Boston University.

TODD M. STAFFORD, director of Legal Writing Program, legal writing professor. BA, Southern Methodist University; JD, Duke University.

NORTON STEUBEN, Nicholas Rosenbaum Professor of Law emeritus.  
Harry Surden, associate professor. BA, Cornell University; JD, Stanford University.

JANE THOMPSON, library assistant director for faculty services, instructor. BA, University of Missouri, Columbia; MA, MLL, JD, University of Denver.

JILL E. TOMPKINS, clinical professor. BA, King's College; JD, University of Maine.

LORENZO TRUJILLO, assistant dean of student affairs and professional programs, professor (attendant rank). BA, MA, JD, University of Colorado at Boulder; EdD, University of San Francisco.

MICHAEL J. WAGGONER, associate professor. AB, Stanford University; LLB, Harvard University.

MARIANNE C. WESSON, Wolf-Nichol Fellow; President's Teaching Scholar; professor. AB, Vassar College; JD, University of Texas.

AHMED WHITE, associate professor. BA, Southern University; JD, Yale University.

CHARLES WILKINSON, Moses Lasky Professor of Law; distinguished university professor. BA, Denison University; LLB, Stanford University.

# College of Music

*Daniel P. Sher, dean*

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school website: [www.colorado.edu/music](http://www.colorado.edu/music)



**T**HE COLLEGE OF MUSIC provides specialized training designed to prepare students for a variety of careers in music. The college offers three undergraduate degrees, two certificate programs, and four graduate degrees; numerous performance opportunities are also available.

Established by the Regents of the University of Colorado in 1920, the College of Music is a fully accredited member of the National Association of Schools of Music.

## Mission

The mission of the College of Music at CU-Boulder is to promote excellence in music through distinguished instruction in performance, composition, musicology, theory and teacher preparation, and to provide opportunities for performance, creative activities, research and scholarship, and teaching.

The college is dedicated to:

- providing music majors the opportunity to develop their knowledge, understanding, and ability in the various aspects of music;
- preparing students for careers as performers, composers, scholars, teachers, administrators, and other professionals in the field of music;
- broadening and deepening the knowledge and understanding of music through research, teaching, creative activities, and publication; and
- enriching the lives of students and faculty as well as the community, state, nation, and the world with a variety of performances and publications.

The College of Music is an academic community committed to maintaining a climate of mutual respect and collegiality showing appreciation for a diversity of musical cultures and individual backgrounds.

The widely varied functions of music in the world today present many challenging and interesting opportunities for teachers, performers, creative artists, technicians, and commercial personnel. While these different pursuits require specialized emphases, the faculty of the College of Music recognize the musical and educational experiences that are common to all. Therefore, each curriculum of the College of Music is designed to present music as an integrated whole. Solo performance and technique, ensemble performance, historical and theoretical studies, concert and recital opportunities, and elective courses both inside and outside the college are intended to give students a balanced approach to musical understanding and musicianship.

The college maintains a ratio of approximately one faculty member for every 10 students. This enables students to benefit from dynamic, personal interaction with their professors. The

college also offers students regular academic advising to ensure that they complete their degrees without unnecessary delay.

In addition to training in the various professions of music, the college provides general music studies and activities for the non-major; broad cultural programs (concerts, recitals, lectures) for the university and Boulder communities; favorable conditions for research in music; and service activities to the state and nation.

## Major Fields and Degrees

Undergraduate degrees include the bachelor of music (BM), the bachelor of arts in music (BA), and the bachelor of music education (BME). Students may also elect to earn a certificate in jazz studies or music technology in conjunction with their degree. In addition to a substantial core of studies in music, the BA in music program allows a wide choice of study in areas outside of music. BM areas of concentration include: composition, musicology, performance, and jazz studies. The major emphasis areas in the BME program are: choral, choral-general, instrumental, and instrumental-general.

Incoming freshmen and transfer students in the College of Music are normally declared as music majors before or at the beginning of their first semester. There is no minor in music.

Qualified students may receive both the bachelor of music and bachelor of music education degrees by taking the required extra work (approximately 30 additional semester credit hours). Intent to be admitted to candidacy for both degrees should be indicated as soon as possible, preferably by the end of the sophomore year. Students may also pursue double degrees in music and an outside field such as engineering, business, etc. Questions may be directed to the associate dean for undergraduate studies, College of Music, 303-735-2283, or [ugradmus@colorado.edu](mailto:ugradmus@colorado.edu).

Graduate degrees include the master of music (MM), the master of music education (MME), doctor of musical arts (DMA), and doctor of philosophy (PhD). Major fields in the master of music and doctor of musical arts degrees are conducting, composition, music theory (MM only), jazz studies, pedagogy, and performance. The master of music education degree is designed to provide advanced instruction for teachers in the elementary and secondary schools. The PhD is a research degree for the fields of musicology and music education.

Graduate degrees are offered through the Graduate School and additional information can be found in the Graduate School section as well as in the curricula listed for the college. Correspondence regarding details not included in this publication should be directed to the associate dean for graduate studies, 303-492-2207 or [gradmusic@colorado.edu](mailto:gradmusic@colorado.edu).

## Facilities

The College of Music has several beautiful performance halls, including the 2,000-seat Macky Auditorium, the 500-seat Grusin Music Hall, the 250-seat Music Theatre, and the 120-seat Chamber Hall. The college is located primarily in the Warner Imig Music Building, a large complex of practice rooms, faculty studios, offices, ensemble rehearsal areas, seminar facilities, and classrooms. An addition to the east side of the building features a 4,300 square foot rehearsal space with a 35-foot ceiling and acoustical draping. Additional rehearsal and classroom facilities are located in Macky.

The college's outstanding Howard B. Waltz Music Library is considered to be among the nation's most comprehensive. The library contains over 150,000 volumes, scores, recordings, and periodicals. Computerized facilities are provided for listening to recordings and practicing ear training. Computer terminals are available for computer-based reference searching. The Music Library also includes the American Music Research Center, a unique facility dedicated to the discovery of new information about American music. The center sponsors concerts and scholarly activities and serves as an archive for several extensive collections of American music.

The college also features extensive facilities for music technology and electronic music study. The Computer-Assisted Music Laboratories (I and II) are multi-purpose labs designed primarily for classroom instruction. They feature numerous workstations, each with a Musical Instrument Digital Interface, sampling keyboard, and a computer. The CRUNCH lab is a fully-featured electronic music project studio. This lab is optimized for computer music research (including live interactive performance systems), as well as sound recording and editing projects and audio/video production. The Class Piano laboratory is equipped with 12 digital pianos.

## Performances

Each year the College of Music presents over 400 concerts by students, faculty, and guests. In addition to individual musical pursuits, students at all levels have the opportunity to perform in a variety of outstanding ensembles including orchestras, choirs, bands, world music ensembles, chamber and early music groups, jazz ensembles and combos, opera productions, and musicals. Many of these groups have been invited to perform at prestigious national and international events. Recitals by students and faculty are supplemented by visits from world-class guest artists, all of which provide the Boulder community with the chance to hear some of the finest music being performed today. The vast majority of these excellent performances are free and open to the public. Other programs presented by CU Concerts include: the Artist Series, CU Opera, Takács Encore Series, and the Holiday Festival. For a schedule of all College of Music performances, call 303-492-8008 or visit [cupresents.org](http://cupresents.org).

## Student Organizations

The student body of the College of Music has its own government, represented by the College of Music Student Union and the Graduate Music Student Council. Honorary music fraternities are Sigma Alpha Iota and Kappa Kappa Psi. Pi Kappa Lambda, the national scholastic honorary music fraternity, is also an active organization on campus. Music education majors are eligible for membership in student chapters of the Na-

tional Association for Music Education (MENC), the American Choral Directors Association, and the American String Teachers Association.

## Entrepreneurship Center

The Entrepreneurship Center for Music helps students think creatively about using their talents and interests in the music industry. The traditional job choices for music students—teaching and performing—are only two of the hundreds of employment options in the \$40 billion global music industry. The center helps students develop an entrepreneurial spirit through specialized courses, guest speakers, workshops, and individual appointments to discuss career options. The internship program provides valuable experience outside of the classroom in arts organizations around the country. More information about the center is available at [www.ec4music.com](http://www.ec4music.com).

## Academic Excellence

### Dean's Honor Roll

A full-time undergraduate student in the College of Music who has completed at least 24 credit hours of course work by the end of the spring semester on the Boulder campus (excluding continuing education), and who earned a semester grade point average of at least 3.700, will be included in the college dean's honor roll for that semester. Notation of the "Dean's Honor Roll" is also listed in the Honors Convocation Program.

### Honors at Graduation

Students achieving a cumulative GPA of 3.700–3.790 (honors), 3.800–3.890 (high honors), and 3.900–4.000 (highest honors) are recognized at commencement.

### Scholarships and Awards

A number of scholarships and awards are designed specifically for students in the College of Music (see below). Undergraduate music majors are eligible for scholarships or renewal of their scholarships as long as they make satisfactory musical progress in their major as determined by the faculty in jury exams and auditions, and maintain a minimum cumulative GPA of 3.000.

Graduate students must enroll as full-time students, maintaining a 3.000 GPA, and make adequate progress toward their degrees. The college offers approximately 70 graduate assistantships as well as graduate fellowships, and a variety of endowed scholarships for graduate students (included below.)

- Nancy and Ted Anderson Music Awards
- Beckie Reeder Arnold Piano Scholarship
- Joyce Mata Ashley Scholarship Fund
- The Bagley Prize
- Frank W. Baird Trumpet Scholarship
- John W. (Jack) Bartram Memorial Scholarship
- Bettina Baruch Foundation Scholarship for Winds
- Virginia Blake Becker Flute Scholarship
- Darrell and Lauren Boyle Music Theatre Scholarship
- Dewitt and Billie Brennan Music Fund
- Charles Byers Choral Music Education Scholarship
- Rebecca Beardmore Chavez Scholarship Fund
- William Clendenin Music History Scholarship
- Berton Coffin Scholarships in Voice
- Arline P. Cohen Scholarship
- Walter and Jenny Kate Collins Memorial Graduate Fellowship in Choral Studies
- Sue Conrad and C. Dickson Titus Memorial Fund

Viola Vestal Coulter Foundation Voice Scholarship in Honor of Harold A. Norblom  
 Wilma and Perry Louis Cunningham Scholarship in Voice  
 Frank and Gina Day Graduate Performance Fellowship  
 Denver Lyric Opera Guild Scholarship  
 Barbara M. Doscher Memorial Voice Scholarship  
 Stephen Robert Dudley Scholarship for Horn  
 Edith E. Edwards Scholarship in Music  
 Cecil Effinger Fellowship in Composition  
 Dorothea Eldridge Music Fund  
 Ewing Memorial Music Scholarship  
 Robert R. Fink Undergraduate Scholarship in Music Theory  
 Wallace F. Fiske Performance Awards  
 James M. Grossi Composition Scholarship  
 Charles Haertling Piano Scholarship  
 Jessie and Albert Henry Memorial Scholarship  
 Everett J. Hilty Carillon Fellowship  
 Everett J. Hilty, Sr. Fund  
 Bernice Holic Piano Scholarship  
 Honors String Quartet Awards  
 Warner and Norma Imig Choral Conducting Scholarship  
 Dennis Jackson Opera Scholarship  
 Freelyn Jeffers Award in Choral Conducting  
 Dale R. Johnson Opera Scholarship  
 Donald L. & Maria A. Johnson Music Awards  
 Keyboard Honors Awards  
 Denés Koromzay String Chamber Music Award  
 George Lynn Memorial Scholarship  
 Scott Robert McBurney Memorial Scholarship in Piano  
 McDowell Opera Endowment  
 Robert K. McIntosh Fund for Music Instruction for Disadvantaged Children  
 Claudia Boettcher Merthan Vocal Scholarship  
 Trudi Mielziner Graduate Opera Scholarship  
 Mile High Band Music Education Scholarship  
 Musicology Academic Achievement Award  
 Music Teachers National Association STAR Award  
 Noris Graduate Piano Award  
 O'Neal Taniguchi Music Entrepreneurship Fund  
 Gabor Ormai String Scholarship  
 Phyliss and Paul Parmelee Memorial Piano Scholarship  
 Denby & Georgia L. Peebles Memorial Fund  
 Peercy-Roth Memorial Scholarship  
 John N. Parsons Musicology Fund  
 Theodore Presser Academic/Performance Award  
 Gregory Philip Ranno Excellence in Music Scholarship  
 Charlotte Orr Reid Memorial Voice Scholarship  
 Anthony and Dorothy Riddle Lyric Theatre Performance Prize  
 Walter Orr Roberts Music Scholarship  
 William Earl Rose, Sr. Scholarship Fund  
 Robin Sawhill Award for Excellence in Piano Performance  
 Charles Sawtelle Memorial Music Scholarship in Jazz Studies  
 Virginia Schwatel Fund for Music Education  
 Schultz/Finlay Marching Band Endowed Scholarship  
 Fay Shwayder String Quartet Awards  
 Martha & Alan Stormo Music Scholarship for Cello  
 Eric Sutton Skinner Memorial Scholarship in Percussion  
 Pete Smythe AMRC Scholarship Fund  
 Galen and Ada Belle Files Spencer Fellowship in Voice  
 Starling Foundation Graduate Violin Award  
 Peter and Julianne Steinhauer AMRC Scholarship in honor of Wayne Scott  
 Crick Streamer Memorial Scholarship  
 Beth Suitts CU Opera Endowment  
 Takács Scholarship Endowment in Memory of Fay Shwayder  
 Takács Society String Scholarship  
 Jean L. and Jack C. Thompson Jazz Endowment Fund  
 Louise Touhy Music Scholarship  
 Gloria and Martin Trotsky Music Scholarships

Howard B. Waltz Composition Scholarship  
 Howard B. Waltz Music Scholarship  
 Howard B. Waltz Piano Scholarship  
 Judith Richardson Waterman Choral Music Education Scholarships  
 Katherine Anne Suber Whiton Memorial Scholarship in String Bass  
 Lynn Whitten Fellowship in Graduate Choral Conducting  
 Brownlow V. Wilson Music Education Scholarship  
 Wright Endowment for Colorado Light Opera  
 Paula Marie and H. Rolan Zick Endowment

## Academic Standards

### Academic Ethics

Students are expected to conduct themselves in accordance with the highest standards of honesty and integrity. Cheating, plagiarism, illegitimate possession and disposition of examinations, alteration, forgery, or falsification of official records, and similar acts or the attempt to engage in such acts are grounds for suspension or expulsion from the university.

In particular, students are advised that plagiarism consists of any act involving the offering of the work of someone else as their own. It is recommended that students consult with their instructors as to the proper preparation of reports, papers, etc., in order to avoid this and similar offenses. Students are expected to be acquainted with and abide by provisions of the University of Colorado at Boulder Honor Code.

### Scholastic Requirements

To remain in good academic standing, a student must maintain at least a 2.000 cumulative grade point average (GPA) and make satisfactory progress toward the degree as defined by the College of Music and area faculty.

Academic probation is an official warning that a student's grades are unsatisfactory. Any undergraduate student who has a cumulative or semester grade point average below 2.000 is automatically placed on probation for the following three semesters. (Cumulative grade point average is calculated on grades earned at this university.) If a probationary student's grade point averages (semester and cumulative) at the end of any probationary semester and the cumulative probationary period are not 2.000 or above, automatic suspension results. Any undergraduate student who has a cumulative or semester grade point average below 1.000 also is automatically suspended without a probationary period.

While on suspension, students may not register for regular day classes during the fall or spring semester on any CU campus and are not considered eligible for graduation. To regain good academic standing, suspended students must earn a semester GPA of 2.000 or higher and raise their cumulative GPA to 2.000 or above during the following term by successfully completing at least 12 credits (with no withdrawals, no incomplete grades, and no courses taken *pass/fail*) through continuing education or summer session classes. The Division of Continuing Education and Professional Studies (303-492-5148) should be contacted for more information.

Courses taken at other campuses or institutions will not be used for purposes of reinstatement, but credits earned may be transferred according to normal procedures and policies after reinstatement and readmission. Suspended students who raise their cumulative GPA to 2.000 or above may then petition for readmission and receive a personal hearing before the associate dean. Suspended students who do not raise their cumulative GPA to 2.000 or above are dismissed from the college and university. Students who have been dismissed must reapply for admission to the university after being reinstated by the college.

Undergraduate music majors are eligible for scholarships or renewal of their scholarships as long as they make satisfactory progress in their major (as determined by the faculty), demonstrate satisfactory proficiency in jury exams and auditions, enroll in ensemble, and maintain a minimum cumulative GPA of 3.000. Students who have a cumulative GPA below 3.000 will be placed on scholarship probation for a maximum of two semesters (consecutive or cumulative), provided the GPA improves each semester. Students on scholarship probation who do not earn a cumulative GPA of 3.000 or higher by the end of the probationary period will have their scholarships revoked.

### Appeals

Students have the right to appeal decisions of academic dishonesty and to petition for exceptions to the academic policies stated in this catalog. Appeals should be directed to the Office of the Dean. College of Music policies stated below are in addition to the campus policies.

## Undergraduate Admission and Enrollment Policies

### Admission Requirements

In addition to the entrance requirements of the university outlined in Undergraduate Admission in the General Information section, freshman and transfer students must meet College of Music entrance requirements. Successful College of Music applicants have extensive prior experience in music (including private study), the ability to read and sight-read music notation, an understanding of music fundamentals or basic music theory, and elementary piano skills. Students with appropriate skill in piano sight reading and keyboard harmony may be able to test out of all or part of the secondary (class) piano requirement included in their degree plan.

### Auditions

An audition is required for all prospective undergraduate music majors. Undergraduate auditions are held in Boulder on selected Saturdays in January and February. Alternate audition dates may also be scheduled if necessary. If travel distance is prohibitive, prospective students may substitute a high-quality recording. Applicants should identify themselves by name and list selections and titles at the beginning of the recording. In order for students to be fully considered for financial assistance, live auditions should be completed and recordings should be received by February 15. Students should prepare a 10–20 minute audition program in accordance with the audition requirements that are listed on the College of Music website: [www.colorado.edu/music/applying/ugradapply/auditionreq.html](http://www.colorado.edu/music/applying/ugradapply/auditionreq.html).

Contact the Undergraduate Office at 303-735-2283 or [ugradmus@colorado.edu](mailto:ugradmus@colorado.edu) for more information.

Admissions decisions for music education applicants are based on academic qualifications, audition results, and an interview conducted by two or more music education faculty members. Interviews address written and verbal communication skills, motivation and goals related to music teaching, prior music teaching experiences, and affective characteristics associated with effective music teachers. For information about music education interviews, contact Margaret Berg, music education chair, at 303-735-5301 or [margaret.berg@colorado.edu](mailto:margaret.berg@colorado.edu).

### Provisional Admission

Applicants who meet all admission requirements except the minimum academic preparation standards (MAPS) may petition the associate dean for undergraduate studies for admission as a provisional student.

### Transfer Students

Transfer students from within the university and from other universities must meet the general requirements of the university and the specific requirements of the College of Music, including the audition. See Undergraduate Admission in the General Information section for specific requirements.

### Nondegree Students

With the written permission of the instructor and on a space available basis, nondegree students may take any class offered by the College of Music except private applied instruction.

### Attendance Requirements

Successful work in the College of Music is dependent on regular attendance in all classes. At the beginning of each semester, instructors will inform students of policies governing grading and attendance in each class. Students are expected to attend classes and comply with the attendance requirements specified by their instructors. For ensembles and other performance classes, attendance at dress rehearsals, major concerts, and other approved/sanctioned performances, as listed in the course syllabus, also is required.

### Convocations and Recitals

All degree students are required to pass Music Convocation (CONV 1990) for a minimum of six semesters. Transfer students normally do four semesters. Graduation is not permitted until this requirement is met. If necessary, students may register for two convocations in one semester (CONV 1990 and 2990.) Discrepancies concerning convocation credit should be resolved within one year of the semester in question.

Each semester, students are given a list of convocations and recitals from which a minimum of seven must be attended to receive a passing grade. Events in which the student participates do not count toward this requirement. Monitors are present at each event to distribute and collect attendance slips. Students are encouraged to keep their copies of attendance slips for verification.

### Ensembles

All undergraduate students enrolled in applied music must participate in a university ensemble appropriate to and required by their degree program. (Students enrolled in Conducting courses must concurrently be enrolled in a conducted ensemble.) Voice performance majors are not required to be in ensembles during the semester of their senior recital, and bachelor of music education students are exempt from ensemble participation during the student teaching semester. Any student who studies applied music beyond degree requirements must participate concurrently in a university ensemble. Double majors need be in only one ensemble at a time.

### Sophomore Proficiency

Students must pass a variety of jury tests and proficiency exams during their degree work. Each applied area has different requirements, so students need to consult the chair of their area and/or studio professor. However, all students must pass a sophomore proficiency exam. Students who cannot pass this

exam receive an incomplete grade and cannot progress to the junior level of applied study until the proficiency is achieved. Studio professors provide students with proficiency and repertoire requirements.

### Course Load

The normal academic load for an undergraduate student in the College of Music is 15–17 semester hours. Schedules of fewer than 12 or more than 19 hours must have approval of the associate dean for undergraduate studies of the College of Music.

See limitations on registration under the Graduate School section for graduate student course load stipulations.

### Dropping a Course

Students should adhere to the deadlines for dropping a course in the registration handbook distributed each semester. After a certain date each semester, a special action form signed by the instructor and associate dean for undergraduate studies is required to drop a course.

### Pass/Fail Option

The *pass/fail* option for 12 credits is open only to undergraduate students. Music education students may only use the *pass/fail* option for student teaching. *Pass/fail* hours are to be selected from nonmusic courses and are in addition to those that may be taken in honors. Courses so elected are taken according to the *pass/fail* policies of the college or school concerned.

*Pass/fail* hours that transfer students can apply toward degree requirements from departments within the university are limited to 1 in every 8 semester hours earned in the College of Music.

### Residence Requirement

Of the hours required for an undergraduate degree, the last 56 credits must be completed in residence in the College of Music. This may be reduced by the faculty for excellent work done in this university and for high scholarship exhibited at previous institutions attended. In no case shall the minimum be fewer than 40 hours distributed over three semesters. At least 9 hours in applied music (private instruction) must be earned in this college for the degrees bachelor of music and bachelor of music education, and 6 hours for the bachelor of arts in music.

### Student Work

A copy of all scholarly student papers that generate credit (dissertations, theses, projects, lecture recitals, and other document-producing activities), whether undergraduate or graduate, is placed in the Music Library. More than one copy may be required in individual degree programs. To ensure that degree requirements have been met and the document is appropriate for placement in the Music Library, all faculty-approved documents must be presented to the appropriate associate dean's office at least two weeks before the graduation date.

Any recital required for graduation is recorded. Arrangements are to be made through the College of Music Concerts Office, and a recording fee is charged. The original recording is placed in the Music Library.

### Time Out/Withdrawal

The online Schedule of Courses indicates the deadlines for withdrawal from the university and the financial penalties incurred with each. Students wishing to withdraw or take time out should follow appropriate university guidelines (contact the

office of the registrar or the associate dean of music). Those who stop attending class without officially withdrawing will receive *F*s in each of their courses.

## Undergraduate Degree Programs

The degrees bachelor of arts in music, bachelor of music, and bachelor of music education are granted by the university, upon recommendation of the faculty of the College of Music, to those who have successfully completed prescribed requirements.

Students must complete graduation forms and schedule a final checkout appointment by December 15 for May/August graduation and by October 1 for December graduation.

### General Education in Music

The undergraduate degrees in music emphasize knowledge and awareness of:

- solo performance and technique, including the various musical styles used in compositions for students' musical instruments or voice;
- each composition performed, notation and editorial signs used in the compositions performed, and repertoire for the students' performance medium;
- ensemble performance, including familiarity with major composers in the student's performance medium and the techniques necessary to blend a number of individual musicians into an ensemble;
- concert and recital opportunities, including literature composed for different performance forces;
- theoretical studies, including tonal harmony, counterpoint, voice-leading, and notation; formal principles and analytical techniques for tonal music; and instruments in score, including the concert pitch of transposing instruments and nomenclature used in scores; and
- historical studies, including representative works in the canon of musical literature from chant to the present, the general outlines of the history of music from the Middle Ages to the present, music in the United States, and musical cultures other than those of Europe.

In addition, students completing any of the degrees in music are expected to acquire the ability to:

- perform solo and ensemble repertoire demonstrating musical artistry, technical proficiency, and stylistic understanding;
- demonstrate an understanding of theoretical studies, including sight-reading and ear training; and
- demonstrate an understanding of historical studies including the analysis of stylistic periods and music of non-Western cultures.

### Double-Degree Programs

Students may complete requirements in two fields and receive two degrees from the university. Such double-degree programs are available combining music with business, engineering, journalism and mass communication, or disciplines in the College of Arts and Sciences. Students must make application for a double-degree program in both the College of Music and the Leeds School of Business, the College of Engineering and Applied Science, the School of Journalism and Mass Communication, or the College of Arts and Sciences. Any other combined program must be arranged by consulting both schools or colleges.

## Bachelor of Arts in Music

The bachelor of arts in music degree has as its goal a broad education in music within a liberal arts context. Although students may elect to pursue special interests, the primary emphasis is on the development of basic musicianship, an ability to perform music, and a broad knowledge of the foundations and principles of music as an art. The bachelor of arts in music may be completed with or without an emphasis in musicology and world musics.

Students may elect to pursue a degree in a nonmusic field in addition to a music degree. This is most often done with a BA in music; double degrees typically require more than four years to complete.

A minimum of 120 semester hours with an overall GPA of 2.000 must be earned for the BA in music degree. Of these hours, at least 68 (66 for musicology emphasis) must be in non-music courses. Thirty must be at the 3000 or 4000 level. A minimum of 44 hours (50 for musicology emphasis) is required in music courses.

The normal pattern for private applied instruction in this degree is one half-hour lesson per week for 2 semester hours of credit. Not more than 16 semester hours (12 for musicology emphasis) of credit in private instruction may be used toward the degree.

Students registered for applied music must participate in an ensemble as recommended by their applied faculty. A maximum of 4 credit hours (6 for musicology emphasis) in ensemble can apply to the BA in music degree.

A recital may be given with permission of the chair of the applied faculty area and the student's advisor.

### Minimum Requirements

In addition to the general requirements listed above, the following specific requirements must be met:

1. Three credits of English composition.
2. Basic proficiency in one foreign language equal to three semesters at the university level. This requirement also may be fulfilled by three years of study in high school in one language or by passing a university proficiency examination.
3. Nonmusic electives to fulfill the minimum requirement of 68 semester hours of credit. Of the nonmusic electives, 37 semester hours of credit must be fulfilled through the College of Arts and Sciences core curriculum. The arts and sciences core curriculum for the BA degree includes:

- 3 credit hours of written communication
- 3 credit hours of historical context
- 3 credit hours of culture/gender diversity
- 3 credit hours of United States context
- 3 credit hours of contemporary societies
- 3 credit hours of ideas and values
- 6 credit hours of literature and the arts
- 13 credit hours of natural science

### Courses and Curricula

For the BA in music degree, students must complete the courses listed below. More detail is given on the degree sheet available from the associate dean of undergraduate studies.

#### Bachelor of Arts in Music

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4

MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
Applied instruction (lessons and literature class) . . . . .	4
Ensemble . . . . .	2
Foreign language . . . . .	3
Written communication . . . . .	3
Nonmusic electives . . . . .	9

#### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2988 Introduction to Music Research . . . . .	1
MUSC 2997 Sophomore Proficiency . . . . .	0
Applied instruction (lessons and literature class) . . . . .	4
Ensemble . . . . .	2
Nonmusic electives . . . . .	18

#### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2
Nonmusic electives . . . . .	22

#### Senior Year

Elective in music history, 4000 level . . . . .	3
Non-Western music, 2000/4000 level . . . . .	3
Nonmusic electives . . . . .	21

#### Bachelor of Arts in Music with an Emphasis in Musicology and World Musics

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
Applied instruction (lessons and literature class) . . . . .	4
Written communication . . . . .	3
Ensemble . . . . .	2
Foreign language . . . . .	3
Nonmusic electives . . . . .	9

#### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2988 Introduction to Musical Research . . . . .	1
MUSC 2997 Sophomore Proficiency . . . . .	0
Applied instruction (lessons and literature class) . . . . .	2
Ensemble . . . . .	2
Nonmusic electives . . . . .	18

#### Junior Year

CONV 1990 Convocation Recitals (two semesters) . . . . .	0
MUSC 2772 World Musics . . . . .	3
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
4000-level theory elective . . . . .	2
Ensemble . . . . .	2
Nonmusic electives . . . . .	17

#### Senior Year

MUSC 2772 World Musics . . . . .	3
MUSC 4112 Ethnomusicology . . . . .	3
4000-level music history elective . . . . .	3
Nonmusic electives . . . . .	20



## Bachelor of Music

The four-year professional curriculum leading to the bachelor of music degree emphasizes creative skill, academic achievement, and artistic performance in music. Concentration areas are offered in performance, composition, musicology, and jazz studies. Performance areas include voice, piano, jazz piano, organ, string instruments, classical guitar, woodwinds, brass, and percussion.

A half recital in the junior year and a full recital in the senior year are required of students in the performance concentration areas, except voice theatre. Students should check with their advisor about preview policies.

A thesis is required of students in the composition and musicology areas. For composition students, the thesis should be an original composition; for musicology students, a major paper. Students should check with their advisor for details.

A senior project is required of students in the voice theatre area. This project may be a senior recital, major role, or direction or design of a major show.

Specific performance group requirements are controlled by the degree plan in each concentration area and are subject to the advisor's judgment in the best interest of the student.

The bachelor of music degrees include requirements in theory, history, and literature of music. Elective study in most degrees requires 30 nonmusic credits, including 3 in English composition, and 12 free electives that may be music or non-music courses. A suggested course sequence is shown below. (More detail is given on the degree sheets available from the associate dean for undergraduate studies.)

### Written Communication

Students pursuing the bachelor of music degree will be required to take one 3-hour course in English composition through the Program for Writing and Rhetoric or the English department. Courses such as First-Year Writing and Rhetoric, Freshman Writing Seminar, or Introduction to Creative Writing fulfill the requirement. The credit hours are applied in the liberal arts electives category. Students are strongly encouraged to complete this requirement by the end of their freshman year.

### Courses and Curricula

All degrees require 120 credit hours.

#### Brass and Percussion Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters)	0
MUSC 1101, 1111 Theory 1 and 2	4
MUSC 1121, 1131 Aural Skills 1 and 2	2
MUSC 1802 Introduction to Musical Styles and Ideas	3
PMUS 1XXX Applied brass/percussion instruction (lessons and literature class)	6
PMUS 1105, 1205 Keyboard Musicianship 1 and 2	2
Ensemble	2
Written communication	3
Electives	6
<b>Sophomore Year</b>	
CONV 1990 Convocation (two semesters)	0
MUSC 2101, 2111 Theory 3 and 4	4
MUSC 2121, 2131 Aural Skills 3 and 4	2
MUSC 2997 Sophomore Proficiency	0
PMUS 2XXX Applied brass/percussion instruction (lessons and literature class)	6

Chamber Music	2
Ensemble	2
Electives	14
<b>Junior Year</b>	
CONV 1990 Convocation (two semesters)	0
MUSC 3802, 3812 History of Music 1 and 2	6
MUSC 2071 Instrumentation	2
MUSC 3176 Conducting 1	2
MUSC 3997 Junior Recital	1
MUSC 4918 Your Music Career	2
PMUS 3XXX Applied brass/percussion instruction (lessons and literature class)	6
Chamber Music	2
Ensemble	2
Upper-division Theory Elective (3000 or 4000 level theory classes, except MUSC 4101)	2
Electives	5
<b>Senior Year</b>	
MUSC 4081 Introduction to Music Technology	3
MUSC 4997 Senior Recital	1
PMUS 4XXX Applied brass/percussion instruction (lessons and literature class)	6
Chamber Music	2
Ensemble	2
Non-Western Music 2000/4000 level	3
Music electives	3
Electives	12

#### Composition Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters)	0
PMUS 1526 Composition (and Composition Seminar)	6
MUSC 1101, 1111 Theory 1 and 2	4
MUSC 1121, 1131 Aural Skills 1 and 2	2
MUSC 1802 Introduction to Musical Styles and Ideas	3
Applied lessons	4
Written communication	3
Ensemble	2
Electives	6
<b>Sophomore Year</b>	
CONV 1990 Convocation (two semesters)	0
MUSC 2071 Instrumentation	2
MUSC 2101, 2111 Theory 3 and 4	4
MUSC 2121, 2131 Aural Skills 3 and 4	2
MUSC 2997 Sophomore Proficiency	0
PMUS 2526 Composition (and Composition Seminar)	6
Applied lessons	4
Ensemble	2
Electives	12
<b>Junior Year</b>	
CONV 1990 Convocation (two semesters)	0
MUSC 3176 Conducting 1	2
MUSC 3802, 3812 History of Music 1 and 2	6
MUSC 4001 New Music Styles and Practices	2
MUSC 4011 16th Century Counterpoint	2
MUSC 4041 Orchestration	2
PMUS 3526 Composition (and Composition Seminar)	6
Ensemble	2
Electives	9
<b>Senior Year</b>	
MUSC 4021 18th Century Counterpoint	2
MUSC 4061, 4071 Tonal Analysis and Post-tonal Theory and Analysis	4
PMUS 4526 Composition (and Composition Seminar)	6
Ensemble	2

Non-Western music, 2000/4000 level . . . . .	3
Electives . . . . .	10

### Classical Guitar Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1326 Guitar Sight Reading . . . . .	1
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
MUSC 2366 Introduction to Accompanying . . . . .	2
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
PMUS 1566 Applied guitar instruction (lessons and literature classes) . . . . .	8
Written communication . . . . .	3
Electives . . . . .	5

### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
PMUS 2566 Applied guitar instruction (lessons and literature classes) . . . . .	8
Ensemble . . . . .	2
Music electives . . . . .	3
Electives . . . . .	12

### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4061 Tonal Analysis . . . . .	2
PMUS 3566 Applied guitar instruction (lessons and literature classes) . . . . .	7
Ensemble . . . . .	2
Upper-division theory or history elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2/3
Electives . . . . .	9

### Senior Year

MUSC 4106 Guitar Literature . . . . .	2
MUSC 4997 Senior Recital . . . . .	1
PMUS 4566 Applied guitar instruction (lessons and literature classes) . . . . .	7
Ensemble . . . . .	2
Non-Western music, 2000/4000 level . . . . .	3
Electives . . . . .	14

### Harp Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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### Freshman Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
PMUS 1576 Applied harp instruction (lessons and literature class) . . . . .	8
Written communication . . . . .	3
Ensemble . . . . .	2
Electives . . . . .	8

### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
PMUS 2105, 2205 Keyboard Musicianship 1 and 2 . . . . .	2
PMUS 2576 Applied harp instruction (lessons and literature class) . . . . .	8
Ensemble . . . . .	2
Electives . . . . .	14

### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 3176 Conducting 1 . . . . .	2
MUSC 2071 Instrumentation . . . . .	2
PMUS 3576 Applied harp instruction (lessons and literature class) . . . . .	7
Chamber Music . . . . .	1
Ensemble . . . . .	2
Electives . . . . .	9

### Senior Year

MUSC 4997 Senior Recital . . . . .	1
PMUS 4576 Applied harp instruction (lessons and literature class) . . . . .	7
Chamber Music . . . . .	2
Ensemble . . . . .	2
Non-Western Music 2000/4000 . . . . .	3
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2
Electives . . . . .	9

### Organ Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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### Freshman Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1616 Applied organ instruction (lessons and literature class) . . . . .	6
Ensemble . . . . .	2
Performance minor . . . . .	2
Written communication . . . . .	3
Electives . . . . .	6

### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2265 Service Playing Techniques . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
MUSC 3176 Conducting 1 . . . . .	2
PMUS 2616 Applied organ instruction (lessons and literature class) . . . . .	8
Ensemble . . . . .	2
Performance minor . . . . .	2
Electives . . . . .	8

### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4011 or 4021 16th/18th Century Counterpoint . . . . .	2
MUSC 4285, 4295 Organ Survey . . . . .	6
PMUS 3616 Applied organ instruction (lessons and literature class) . . . . .	7
Ensemble . . . . .	2
Electives . . . . .	8

### Senior Year

MUSC 4011 or 4021 16th/18th Century Counterpoint . . . . .	2
MUSC 4997 Senior Recital . . . . .	1
PMUS 4616 Applied organ instruction (lessons and literature class) . . . . .	7
Non-Western music, 2000/4000 level . . . . .	3
Ensemble . . . . .	1
Electives . . . . .	14

### Piano Performance Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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### Freshman Year

CONV 1990 Convocation (two semesters) . . . . .	0
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MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1325 Sight Reading for Piano . . . . .	1
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
MUSC 2365 Introduction to Accompanying . . . . .	2
PMUS 1636 Applied piano instruction (lessons and literature classes) . . . . .	6
Written communication . . . . .	3
Electives . . . . .	9

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2325 Applied Harmony for the Keyboard . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
PMUS 2636 Applied piano instruction (lessons and literature classes) . . . . .	6
PMUS 4105 Supervised Accompanying . . . . .	2
Electives . . . . .	14

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3176 Conducting 1 (fall) . . . . .	2
MUSC 3345/3355 Piano Pedagogy 1 and 2 . . . . .	4
MUSC 3802/3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4061 Tonal Analysis or MUSC 4071 Post-tonal Theory and Analysis . . . . .	2
PMUS 3636 Applied piano instruction (lessons and literature classes) . . . . .	6
Band, orchestra, or choir . . . . .	2
Performance minor . . . . .	4
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2
Electives . . . . .	3

**Senior Year**

MUSC 4325, 4335 Piano Literature 1 and 2 . . . . .	4
MUSC 4997 Senior Recital . . . . .	1
PMUS 4636 Applied piano instruction (lessons and literature classes) . . . . .	6
PMUS 4105 Supervised Accompanying . . . . .	2
Non-Western music, 2000/4000 level . . . . .	3
Electives . . . . .	12

**Jazz Piano Performance Concentration Area***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EMUS 1427 Jazz Ensemble . . . . .	2
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1325 Sight Reading for Piano . . . . .	1
MUSC 2365 Introduction to Accompanying . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1636 Applied Piano Instruction (lessons and literature classes) . . . . .	4
PMUS 1806 Applied Jazz Piano Instruction (lessons and literature classes) . . . . .	6
Written communication . . . . .	3
Electives . . . . .	3

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EMUS 1427 Jazz Ensemble . . . . .	2
EMUS 1437 Jazz Combo . . . . .	1
HIST 2437 African American History . . . . .	3
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
MUSC 3081 Jazz Theory and Aural Foundations . . . . .	3
MUSC 3997 Classical Recital . . . . .	1
PMUS 2636 Applied Piano Instruction (lessons and literature classes) . . . . .	4
PMUS 2806 Applied Jazz Piano Instruction (lessons and literature classes) . . . . .	5
Electives . . . . .	6

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EMUS 3427 Jazz Ensemble . . . . .	1
EMUS 3437 Jazz Combo . . . . .	2
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3061, 3071 Jazz Improvisation 1 and 2 . . . . .	4
PMUS 3806 Applied Jazz Piano Instruction (lessons and literature classes) . . . . .	6
Electives . . . . .	9

**Senior Year**

EMUS 3642 History of Jazz . . . . .	3
EMUS 3437 Jazz Combo . . . . .	2
MUSC 4997 Jazz Senior Recital . . . . .	1
MUSC 4031 Jazz Scoring and Arranging . . . . .	2
PMUS 4806 Applied Jazz Piano Instruction (lessons and literature classes) . . . . .	5
Two credits selected from MUSC 3345, 3355 (Piano Pedagogy 1 and 2), MUSC 4325, 4335 (Piano Literature 1 and 2), or one seminar of piano pedagogy or literature and MUSC 3253 Jazz Techniques for the Music Educator . . . . .	2
Electives . . . . .	14

**Performance with Secondary Emphasis in Jazz  
(Available for Trumpet, Trombone, and Saxophone)***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1105, 1205 Keyboard Musicianship . . . . .	2
Applied Instruction (lessons and literature class) . . . . .	6
University Ensemble . . . . .	2
Written Communication . . . . .	3
Electives . . . . .	6

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
PMUS 1515 Jazz Piano Class . . . . .	2
MUSC 3081 Jazz Theory/Aural Foundations . . . . .	3
Applied Instruction (lessons and literature class) . . . . .	6
University Ensemble . . . . .	2
EMUS 1507 Chamber Music . . . . .	2
Music Electives (Performance minor for saxophone students) . . . . .	4
Electives . . . . .	6

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3061 or 3071 Jazz Improvisation 1 or 2 . . . . .	2
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
Applied Instruction (lessons and literature class) . . . . .	6
University Ensemble . . . . .	1
EMUS 3507 Chamber Music . . . . .	1
EMUS 3427 Jazz Ensemble . . . . .	1
EMUS 3437 Jazz Combo . . . . .	1
Electives . . . . .	10

**Senior Year**

MUSC 4997 Senior Recital . . . . .	1
MUSC 3273 Jazz Techniques for the Music Educator . . . . .	2
MUSC 4031 Jazz Arranging 1 . . . . .	2
EMUS 3427 Jazz Ensemble . . . . .	2
EMUS 3437 Jazz Combo . . . . .	2
Applied Instruction (lessons and literature class) . . . . .	6

Non-Western Music or History of Jazz . . . . .	3
Electives . . . . .	12

### Jazz Studies Concentration Area

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters) . . . . .	0
ETHN 2001 Foundations of Ethnic Studies . . . . .	3
MUSC 1101, 1111 Theory 1 and 2. . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas. . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2. . . . .	2
PMUS 1xxx Applied Instruction . . . . .	8
Ensemble . . . . .	2
Written Communication. . . . .	3
Electives . . . . .	3

#### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
HIST 2437 African American History . . . . .	3
MUSC 2101, 2111 Theory 3 and 4. . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 3081 Jazz Theory/Aural Foundations . . . . .	3
MUSC 3642 History of Jazz . . . . .	3
MUSC 2997 Sophomore Proficiency. . . . .	0
PMUS 1515 Jazz Piano Class. . . . .	2
PMUS 2xxx Applied Instruction . . . . .	8
Ensemble . . . . .	4
Electives . . . . .	1

#### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3061, 3071 Jazz Improvisation 1 and 2. . . . .	4
MUSC 4031, 4091 Jazz Arranging 1 and 2. . . . .	4
MUSC 3997 Junior Recital . . . . .	1
PMUS 3xxx Applied Instruction . . . . .	5
Ensemble . . . . .	2
Electives . . . . .	12

#### Senior Year

MUSC 4997 Senior Recital . . . . .	1
PMUS 4xxx Applied Instruction . . . . .	5
Non-Western Music, 2000/4000 level . . . . .	3
Ensemble . . . . .	3
Music Electives . . . . .	2
Electives . . . . .	12

### String Performance Concentration Area: Double Bass, Harp, Viola, Violin, and Violoncello

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters) . . . . .	0
EMUS 1327 Orchestra . . . . .	2
MUSC 1101, 1111 Theory 1 and 2. . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas. . . . .	3
PMUS 1XXX Applied string instruction (lessons and literature classes) . . . . .	8
PMUS 1105, 1205 Keyboard Musicianship 1 and 2. . . . .	2
Written communication . . . . .	3
Electives . . . . .	8

#### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
EMUS 1327 Orchestra . . . . .	2
MUSC 2101, 2111 Theory 3 and 4. . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency. . . . .	0
MUSC 3273 String Pedagogy. . . . .	2

PMUS 2XXX Applied string instruction (lessons and literature classes) . . . . .	8
PMUS 2105, 2205 Keyboard Musicianship 3 and 4. . . . .	2
Electives . . . . .	12

#### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
EMUS 3327 Orchestra . . . . .	2
MUSC 2071 Instrumentation . . . . .	2
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
PMUS 3XXX Applied string instruction (lessons and literature classes) . . . . .	7
PMUS 4517 Orchestral Repertoire . . . . .	2
Chamber music. . . . .	1
Electives . . . . .	7

#### Senior Year

EMUS 3327 Orchestra . . . . .	2
MUSC 4997 Senior Recital . . . . .	1
PMUS 4XXX Applied string instruction (lessons and literature classes) . . . . .	7
Chamber music. . . . .	2
Non-Western music, 2000/4000 level . . . . .	3
Upper-division theory or musicology elective (not MUSC 4101) . . . . .	2-3
Electives . . . . .	9

### Voice Performance Concentration Area

One year of study at the university level of each of two foreign languages is required of vocal performance majors.

<i>Required Courses</i>	<i>Semester Hours</i>
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#### Freshman Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2. . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1544, 1554 Italian/English Diction . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas. . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2. . . . .	2
PMUS 1726 Applied Voice Instruction (lessons and literature classes). . . . .	6
Ensemble . . . . .	2
Written communication . . . . .	3
Electives . . . . .	8

#### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4. . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency. . . . .	0
PMUS 2105, 2205 Keyboard Musicianship 3 and 4. . . . .	2
PMUS 2726 Applied Voice Instruction (lessons and literature classes). . . . .	6
Ensemble . . . . .	2
Electives (including foreign language) . . . . .	13

#### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3193 Pedagogy for Young Voices . . . . .	2
MUSC 3464, 3444 German/French Diction . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
PMUS 3726 Applied Voice Instruction (lessons and literature classes). . . . .	7
Ensemble . . . . .	2
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2
Electives (including foreign language) . . . . .	10

#### Senior Year

MUSC 4997 Senior Recital . . . . .	1
PMUS 4726 Applied Voice Instruction (lessons and literature classes). . . . .	7
PMUS 4137, 4147 Opera Theatre 1 and 2 . . . . .	2
Ensemble . . . . .	1
Non-Western music, 2000/4000 level . . . . .	3
Electives . . . . .	11

**Voice Performance with Elective Studies in Music Theatre***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1544, 1554 Italian/English Diction . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
PMUS 1726 Applied Voice Instruction (lessons and literature classes) . . . . .	6
Ensemble . . . . .	2
Theatre/dance elective . . . . .	1
Written communication . . . . .	3
Electives (including foreign language) . . . . .	6

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
PMUS 2105, 2205 Keyboard Musicianship 3 and 4 . . . . .	2
PMUS 2726 Applied Voice Instruction (lessons and literature classes) . . . . .	6
THTR 1019 and 1029 Foundations of Theatre 1 and 2 . . . . .	6
Beginning ballet . . . . .	1
Ensemble . . . . .	1
Electives (including foreign language) . . . . .	10

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3193 Pedagogy for Young Voices . . . . .	2
PMUS 3167 Opera Theatre Stagecraft . . . . .	3
PMUS 3726 Applied Voice Instruction (lessons and literature classes) . . . . .	6
PMUS 4137 Opera Theatre 1 . . . . .	1
PMUS 4147 Opera Theatre 2 . . . . .	1
PMUS 4167 Opera Theatre Lab . . . . .	1
THTR 2003 Acting 1 . . . . .	3
THTR 3053 Acting 2 . . . . .	3
Ensemble . . . . .	1
Electives . . . . .	3

**Senior Year**

MUSC 4101 . . . . .	2
PMUS 4157 Opera Practicum . . . . .	2
PMUS 4167 Opera Theatre Lab . . . . .	1
PMUS 4726 Applied Voice Instruction (lessons and literature classes) . . . . .	6
Non-Western music, 2000/4000-level . . . . .	3
Senior project (or major role, or design or direction of a major production) . . . . .	0
Theatre and dance elective . . . . .	1
Upper-division theory elective (3000 or 4000 level theory classes except MUSC 4101) . . . . .	2
Electives . . . . .	9

**Woodwind Performance Concentration Area***Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1XXX Applied wind instruction (lessons and literature classes) . . . . .	6
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
Ensemble . . . . .	2
Written communication . . . . .	3
Electives . . . . .	6

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
PMUS 1XXX Applied wind instruction (lessons and literature classes) . . . . .	8
Chamber music . . . . .	2
Ensemble . . . . .	2
Music electives . . . . .	4
Electives . . . . .	12

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 2071 Instrumentation . . . . .	2
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
PMUS 1XXX Applied wind instruction (lessons and literature classes) . . . . .	7
Chamber music . . . . .	2
Ensemble . . . . .	2
Upper-division theory elective (3000 or 4000 level theory classes except MUSC 4101) . . . . .	2
Electives . . . . .	7

**Senior Year**

MUSC 4997 Senior Recital . . . . .	1
PMUS 1XXX Applied wind instruction (lessons and literature classes) . . . . .	7
Chamber music . . . . .	2
Ensemble . . . . .	2
Non-Western music, 2000/4000 level . . . . .	3
Electives . . . . .	12

**Musicology Concentration Area**

In addition to the requirements applying to all bachelor of music curricula, a second year proficiency is required in one foreign language.

*Required Courses* *Semester Hours***Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
HIST 1010, 1020 History of Western Civilization . . . . .	6
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1105, 1205 Keyboard Musicianship 1 and 2 . . . . .	2
Applied instruction (lessons and literature classes) . . . . .	4
Ensemble . . . . .	2
Written communication . . . . .	3
Electives . . . . .	3

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
HIST 1010, 1020 . . . . .	6
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
Applied instruction (lessons and literature classes) . . . . .	4
Ensemble . . . . .	2
Electives . . . . .	18

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 3176 Conducting 1 . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
Applied instruction (lessons and literature classes) . . . . .	4
Ensemble . . . . .	2
Non-Western music 2000/4000 level . . . . .	3
Period and topical history (4000 level) or MUSC 4112 Ethnomusicology . . . . .	12
Electives . . . . .	11

**Senior Year**

MUSC 4011 16th Century Counterpoint and MUSC 4021 18th Century Counterpoint or MUSC 4081 Music Technology . . . . .	4
MUSC 4061 Tonal Analysis and MUSC 4071 Post Tonal Analysis . . . . .	4
MUSC 4957 Senior Thesis . . . . .	4
TMUS 4403 Special Studies . . . . .	2
Period and topical history (4000 level) or MUSC 4112 Ethnomusicology . . . . .	12

**Bachelor of Music Education**

The purpose of the four-year professional program leading to the bachelor of music education (BME) degree is to prepare students to teach music in elementary and secondary schools. Students completing this degree program qualify for a Colorado K–12 music teaching license. Students also may apply for teaching licenses in other states that have reciprocity agreements with Colorado.

Because of the varying challenges and opportunities associated with teaching music in K–12 school contexts, the undergraduate music education curriculum strikes a balance between specialization and generalization. BME students must demonstrate a sufficiently broad knowledge of the entire music program/curriculum, but also possess the specialized skills necessary to be a successful general music, choir, orchestra, or band instructor.

**Courses and Curricula**

Four basic curricular options are provided for students pursuing the bachelor of music education degree: choral, choral-general, instrumental, and instrumental-general emphases. The choral-general and instrumental-general emphases include a larger concentration of course work and field experiences related to elementary general music teaching, while the choral and instrumental emphases involve more specialized course work and field experiences related to the teaching of choir, orchestra, or band classes at the secondary level. Within each degree emphasis, students have a limited number of elective credits that may be used to further customize degree work according to their interests and needs.

As first-year students, BME students complete core studies in music and liberal arts. The first music education courses and early field experiences are completed during the sophomore year. During the junior year, students enroll in capstone methods courses and specialized electives that allow for more detailed and sustained study of curricular models, instructional materials, and teaching methods. Internships and full-time student teaching provide culminating experiences during the senior year, as students work in partnership with experienced public school teachers and assume the role and responsibilities of a professional music educator. Internship and student teaching placements are chosen in consultation with faculty advisors and the music education chair.

**Degree Requirements**

A minimum of 126 semester hours with a cumulative GPA of 2.750 must be earned for the BME degree, with no grade below C- in a course. In addition to 40 semester hours of teacher education course work and 150 clock hours of early field experience, music education majors complete 24 semester hours in liberal arts disciplines (English composition, literature and arts, mathematics, social sciences, natural sciences) and 62 hours in music (music theory and aural skills, musicology and ethnomusicology, applied study, ensemble, keyboard and voice, and conducting). Core requirements in liberal arts and music are designated by the College of Music curriculum committee.

**Admission to the Teacher Education Program**

Teacher education is a campuswide function at the University of Colorado. Admission to the music education program in the College of Music does not constitute admission to the teacher education program. Students must apply to the School of Education through the music education chair no later than the second semester of the junior year or by the time 65 credits have been completed toward the BME degree (including approved transfer credits). Students may not register for certain education courses and student teaching until they are admitted to the teacher education program.

Requirements for recommended admission to the teacher education program are:

1. Minimum GPA of 3.000 in music and music education, and a minimum cumulative GPA of 2.750.
2. Minimum grade of C- in MUSC 2103.
3. Twenty-five hours of documented, supervised field experience.
4. Satisfactory functional piano ability as demonstrated by passing the proficiency examination or completing prescribed course work.
5. Satisfactory performance ability as demonstrated by meeting the sophomore proficiency requirements in an applied area of study.
6. Recommendation by the music education faculty. An interview with each student is held by the members of the music education faculty during the first semester of the sophomore year to review the student's progress and qualifications for admission to the teacher education program.

For further information, please refer to the *Handbook for Undergraduate Studies in Music Education*, which can be obtained in the undergraduate studies office.

**Student Teaching**

Students wishing to receive a student teaching assignment must complete an application and submit it to the School of Education through the chair of the music education faculty early in the semester preceding the student teaching semester. Prerequisites for student teaching are:

1. Admission to the teacher education program.
2. A minimum GPA of 3.000 in music and music education, and a minimum cumulative GPA of 2.750.
3. Completion of all required music education and education courses in the music education curriculum.
4. Satisfactory performance ability as demonstrated by passing the junior recital.
5. Passing score on the PLACE Music Assessment.
6. Recommendation by the music education faculty.

**Choral Music Emphasis**

Students must take keyboard or voice as the primary applied area, or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted choral ensemble (University Singers, University Choir, Collegiate Chorale, or Women's Chorus). For keyboard majors, two semesters of independent accompanying may be applied to the ensemble requirement. Students must be enrolled in a conducted choral ensemble when concurrently enrolled for Conducting.

*Required Courses* *Semester Hours*

**Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1XXX Applied instruction (lessons and literature classes) . . . . .	6
PMUS 1105/PMUS 1184 Piano/voice class . . . . .	2
Ensemble . . . . .	2
Written communication . . . . .	3
Electives in non-music core requirements . . . . .	12

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3013 School and Society . . . . .	3
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2103 Introduction to Music Education . . . . .	3
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
MUSC 3133 Teaching General Music 1 . . . . .	2
MUSC 3193 Vocal Pedagogy for Young Voices . . . . .	2
PMUS 2XXX Applied instruction (lessons and literature classes) . . . . .	6
PMUS 2205/PMUS 1184 Piano/voice class . . . . .	2
Ensemble . . . . .	2
Electives in non-music core requirements . . . . .	9

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3023 Teaching in American Schools (fall) . . . . .	3
MUSC 1544 Italian Diction . . . . .	1
MUSC 1554 English Diction . . . . .	1
MUSC 3013 String Class . . . . .	1
MUSC 3023 Woodwind Class or MUSC 3033 Brass Class . . . . .	1
MUSC 3176, 3186 Conducting 1 and 2 . . . . .	4
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4143 Developing Children's Choirs . . . . .	2
MUSC 4203 Music Methods Practicum . . . . .	1
MUSC 4313 Teaching Choral Music . . . . .	3
PMUS 3XXX Applied instruction (lessons and literature classes) . . . . .	5
Conducted choral ensemble . . . . .	2
Upper-division theory elective (3000 or 4000 level theory class, except MUSC 4101) . . . . .	2

**Senior Year**

EDUC 4112 Educational Psychology . . . . .	3
EDUC 4732 Student Teaching . . . . .	8
MUSC 3444 French Diction . . . . .	1
MUSC 4103 Introduction to Student Teaching . . . . .	1
MUSC 4153 Percussion Class . . . . .	1
MUSC 4163 Choral Literature for School Ensembles . . . . .	2
MUSC 4193 Student Teaching Seminar . . . . .	1
Non-Western music, 2000/4000 level . . . . .	3
PMUS 4XXX Applied instruction (lessons and literature classes) . . . . .	3
Ensemble . . . . .	1

**Choral—General Music Emphasis**

Students must take keyboard or voice as the primary applied area, or petition the music education faculty for an exception. A minimum of six of the seven semesters of required ensemble registration must be in a conducted choral ensemble (University Singers, University Choir, Collegiate Chorale, or Women's Chorus), and one semester must be in a world music ensemble. For keyboard majors, one semester of independent accompanying may be applied to the ensemble requirement. Students must be enrolled in a conducted choral ensemble when concurrently enrolled for Conducting.

*Required Courses* *Semester Hours*

**Freshman Year**

CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1XXX Applied instruction (lessons and literature classes) . . . . .	6
PMUS 1105/PMUS 1184 Piano/voice class . . . . .	2
Ensemble . . . . .	2
Written communication . . . . .	3
Electives in non-music core requirements . . . . .	12

**Sophomore Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3013 School and Society . . . . .	3
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2103 Introduction to Music Education . . . . .	3
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
MUSC 3133 Teaching General Music 1 . . . . .	2
MUSC 3193 Vocal Pedagogy and Literature for Young Voices . . . . .	2
PMUS 2XXX Applied instruction (lessons and literature classes) . . . . .	6
PMUS 2205/PMUS 1184 Piano/voice class . . . . .	2
Ensemble . . . . .	2
Electives in non-music core requirements . . . . .	9

**Junior Year**

CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3023 Teaching in American Schools . . . . .	3
MUSC 3013 String Class . . . . .	1
MUSC 3023 Woodwind Class or MUSC 3033 Brass Class . . . . .	1
MUSC 3123 Teaching Choral Music . . . . .	3
MUSC 3176, 3186 Conducting 1 and 2 . . . . .	4
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4113 Teaching General Music 2 . . . . .	3
MUSC 4143 Developing Children's Choir or MUSC 4163 Choral Literature (fall) . . . . .	2
MUSC 4203 Music Methods Practicum . . . . .	1
PMUS 3XXX Applied instruction (lessons and literature classes) . . . . .	5
Conducted choral ensemble . . . . .	2
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2

**Senior Year**

EDUC 4112 Educational Psychology . . . . .	3
EDUC 4732 Student Teaching . . . . .	8
MUSC 4103 Introduction to Student Teaching . . . . .	1
MUSC 4153 Percussion Class . . . . .	1
MUSC 4193 Student Teaching Seminar . . . . .	1
MUSC 4583 Inclusive Music Classroom . . . . .	2
PMUS 4XXX Applied instruction (lessons and literature classes) . . . . .	3
Non-Western music, 2000/4000 level . . . . .	3
Ensemble . . . . .	1

**Instrumental Music Emphasis (Band)**

Students must take wind/brass/percussion as the primary applied area, or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble (Symphony Orchestra, Chamber Orchestra, Wind Symphony, Symphonic Band, or Concert Band), and one semester must be in marching band. Freshmen are strongly encouraged to be in marching band (EMUS 1287) their first semester. Students must be enrolled in a conducted instrumental ensemble when concurrently enrolled for Conducting.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3
PMUS 1XXX Applied instruction (lessons and literature classes) . . . . .	6
PMUS 1105, 1205 Keyboard Musicianship . . . . .	2
Ensemble . . . . .	2
Written communication . . . . .	3
Electives in non-music core requirements . . . . .	12
<b>Sophomore Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3013 School and Society . . . . .	3
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2103 Introduction to Music Education . . . . .	3
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
MUSC 3133 Teaching General Music 1 . . . . .	2
MUSC 3153 Teaching Woodwind Instruments . . . . .	2
MUSC 3163 Teaching String Instruments . . . . .	2
PMUS 1184 Voice Class . . . . .	1
PMUS 2XXX Applied instruction (lessons and literature classes) . . . . .	6
Ensemble . . . . .	2
Electives in non-music core requirements . . . . .	9
<b>Junior Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3023 Teaching in American Schools . . . . .	3
MUSC 3176, 3186 Conducting 1 and 2 . . . . .	4
MUSC 3193 Vocal Pedagogy for Young Voices . . . . .	2
MUSC 3223 Teaching Brass Instruments . . . . .	2
MUSC 3253 Jazz Techniques for the Music Educator . . . . .	2
MUSC 3363 Marching Band Techniques . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4153 Percussion Class . . . . .	1
MUSC 4203 Music Methods Practicum . . . . .	1
MUSC 4443 Teaching Instrumental Music . . . . .	3
PMUS 3XXX Applied instruction (lessons and literature classes) . . . . .	5
Ensemble . . . . .	2
<b>Senior Year</b>	
EDUC 4112 Educational Psychology . . . . .	3
EDUC 4732 Student Teaching . . . . .	8
MUSC 4103 Introduction to Student Teaching . . . . .	1
MUSC 4193 Student Teaching Seminar . . . . .	1
PMUS 4XXX Applied instruction (lessons and literature classes) . . . . .	3
Ensemble . . . . .	1
Non-Western music, 2000/4000 level . . . . .	3
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2

### Instrumental Emphasis (Strings)

Students must take strings as the primary applied area, or petition the music education faculty for an exception. A minimum of five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble (Symphony Orchestra, Chamber Orchestra, or Campus Orchestra). Students must be enrolled in a conducted instrumental ensemble when concurrently enrolled for Conducting.

*Required Courses* *Semester Hours*

<b>Freshman Year</b>	
CONV 1990 Convocation (two semesters) . . . . .	0
MUSC 1101, 1111 Theory 1 and 2 . . . . .	4
MUSC 1121, 1131 Aural Skills 1 and 2 . . . . .	2
MUSC 1802 Introduction to Musical Styles and Ideas . . . . .	3

PMUS 1105, 1205 Keyboard Musicianship . . . . .	2
PMUS 1XXX Applied instruction (lessons and literature classes) . . . . .	6
Ensemble . . . . .	2
Written communication . . . . .	3
Electives in non-music core requirements . . . . .	12

### Sophomore Year

CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3013 School and Society . . . . .	3
MUSC 2101, 2111 Theory 3 and 4 . . . . .	4
MUSC 2103 Introduction to Music Education . . . . .	3
MUSC 2121, 2131 Aural Skills 3 and 4 . . . . .	2
MUSC 2997 Sophomore Proficiency . . . . .	0
MUSC 3133 Teaching General Music 1 . . . . .	2
MUSC 3153 Teaching Woodwind Instruments . . . . .	2
MUSC 3163 Teaching String Instruments . . . . .	2
MUSC 3273 String Pedagogy and Literature . . . . .	2
PMUS 1184 Voice Class (spring) . . . . .	1
PMUS 2XXX Applied instruction (lessons and literature classes) . . . . .	6
Ensemble . . . . .	2
Electives in non-music core requirements . . . . .	6

### Junior Year

CONV 1990 Convocation (two semesters) . . . . .	0
EDUC 3023 Teaching in American Schools . . . . .	3
MUSC 3176, 3186 Conducting 1 and 2 . . . . .	4
MUSC 3193 Vocal Pedagogy for Young Voices . . . . .	2
MUSC 3223 Teaching Brass Instruments . . . . .	2
MUSC 3253 Jazz Techniques for the Music Educator . . . . .	2
MUSC 3802, 3812 History of Music 1 and 2 . . . . .	6
MUSC 3997 Junior Recital . . . . .	1
MUSC 4153 Percussion Class . . . . .	1
MUSC 4203 Music Methods Practicum . . . . .	1
MUSC 4443 Teaching Instrumental Music . . . . .	3
PMUS 3XXX Applied instruction (lessons and literature classes) . . . . .	5
Ensemble . . . . .	2
Electives in non-music core requirements . . . . .	3

### Senior Year

EDUC 4112 Educational Psychology . . . . .	3
EDUC 4732 Student Teaching . . . . .	8
MUSC 4103 Introduction to Student Teaching . . . . .	1
MUSC 4193 Student Teaching Seminar . . . . .	1
PMUS 4XXX Applied instruction (lessons and literature classes) . . . . .	3
Ensemble . . . . .	1
Non-Western music, 2000/4000 level . . . . .	3
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101) . . . . .	2

### Instrumental—General Music Emphasis

Students must take keyboard, strings, or wind/brass/percussion as the primary applied area, or petition the music education faculty for an exception. For keyboard majors, a minimum of four of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble (Symphony Orchestra, Chamber Orchestra, Wind Symphony, Symphonic Band, Concert Band, or Campus Band), one semester must be in a conducted choral ensemble, and one semester must be in a world music ensemble. One semester of independent accompanying may be applied to the ensemble requirement. For string majors, a minimum of five of the seven semesters of required ensemble registration must be in a conducted instrumental ensemble, one semester must be in a conducted choral ensemble, and one semester must be in a world music ensemble. For woodwind, brass, and percussion majors, a minimum of four of the seven semesters of required ensemble participation must be in a conducted instrumental ensemble, one semester must be in marching band, one semester must be in a conducted choral ensemble, and one semester must be in a world



music ensemble. Freshmen are strongly encouraged to be in marching band (EMUS 1287) their first semester. Students must be enrolled in a conducted instrumental ensemble when concurrently enrolled for Conducting.

#### Required Courses

#### Semester Hours

#### Freshman Year

CONV 1990 Convocation (two semesters)	0
MUSC 1101, 1111 Theory 1 and 2	4
MUSC 1121, 1131 Aural Skills 1 and 2	2
MUSC 1802 Introduction to Musical Styles and Ideas	3
PMUS 1105, 1205 Keyboard Musicianship	2
PMUS 1XXX Applied instruction (lessons and literature classes)	6
Ensemble	2
Written communication	3
Electives in non-music core requirements	12

#### Sophomore Year

CONV 1990 Convocation (two semesters)	0
EDUC 3013 School and Society	3
MUSC 2101, 2111 Theory 3 and 4	4
MUSC 2103 Introduction to Music Education	3
MUSC 2121, 2131 Aural Skills 3 and 4	2
MUSC 2997 Sophomore Proficiency	0
MUSC 3133 Teaching General Music 1	2
MUSC 3153 Teaching Woodwind Instruments or MUSC 3223 Teaching Brass Instruments	2
MUSC 3163 Teaching String Instruments	2
PMUS 1184 Voice Class	1
PMUS 2XXX Applied instruction (lessons and literature classes)	6
Ensemble	2
Electives in non-music core requirements	9

#### Junior Year

CONV 1990 Convocation (two semesters)	0
EDUC 3023 Teaching in American Schools	3
MUSC 3176, 3186 Conducting 1 and 2	4
MUSC 3193 Vocal Pedagogy for Young Voices	2
MUSC 3253 Jazz Techniques for Music Educator or MUSC 4583 Inclusive Music Classroom	[2]
MUSC 3802, 3812 History of Music 1 and 2	6
MUSC 3997 Junior Recital	1
MUSC 4113 Teaching General Music 2	3
MUSC 4153 Percussion Class	1
MUSC 4203 Music Methods Practicum	1
MUSC 4443 Teaching Instrumental Music	3
PMUS 1184 Voice Class	1
PMUS 3XXX Applied instruction (lessons and literature classes)	5
Ensemble	2

#### Senior Year

EDUC 4112 Educational Psychology	3
EDUC 4732 Student Teaching	8
MUSC 3253 Jazz Techniques for Music Educator or MUSC 4583 Inclusive Music Classroom	[2]
MUSC 4103 Introduction to Student Teaching	1
MUSC 4193 Student Teaching Seminar	1
PMUS 4XXX Applied instruction (lessons and literature classes)	3
Ensemble	1
Non-Western music, 2000/4000 level	3
Upper-division theory elective (3000 or 4000 level theory classes, except MUSC 4101)	2

## Undergraduate Certificate Programs

### Certificate in Jazz Studies

The Jazz Program offers a Certificate in Jazz Studies for undergraduate music majors. The certificate program consists of an

intense 18-hour curriculum in both academic and performance areas, concluding with a jazz recital. Courses include jazz theory and aural foundations, improvisation, history of jazz, scoring and arranging, jazz piano, jazz techniques for the music educator, jazz combo, and jazz ensemble.

### Certificate in Music Technology

The certificate in music technology provides students with an opportunity to study music technology in greater depth than music degrees currently allow. This certificate program requires 18 credit hours, including five music technology courses, an interdisciplinary performance course, and an independent project (a composition, performance, or research project) under the supervision of a member of the Music Technology faculty. For more information, contact John Drumheller at [drumhell@colorado.edu](mailto:drumhell@colorado.edu).

## Graduate Degree Programs

All graduate degrees in music are granted by the Graduate School of the University of Colorado upon the recommendation of the faculty of the College of Music and approval by the administrative officers of the Graduate School. The information supplied here is supplemental to and must be read in conjunction with the information contained in the Graduate School section. Other information regarding rules applying to graduate degree students in music may be found in supplements to the catalog and in the Graduate Studies in Music Handbook, both available in the office of the College of Music's associate dean for graduate studies. This information can also be viewed online at [www.colorado.edu/music/classes/gradadvising/index.html](http://www.colorado.edu/music/classes/gradadvising/index.html).

### Admission Requirements

Admission requirements for specific degree programs that supplement the Graduate School requirements are discussed in the degree program descriptions that follow. Students are urged to take the general (verbal, quantitative, analytical) portions of the Graduate Record Examination (GRE). GRE scores are required as part of the application to the PhD programs, and are recommended for the DMA, MM in music theory, and Master of Music Education degrees.

### Preliminary Examinations

Just before the beginning of their first semester of work toward a master's or doctoral degree, students are given placement exams covering the major field, several areas of music theory, and music history. Specific requirements vary with the student's degree and program. Students pursuing the master's and doctoral degrees in voice also must pass proficiency requirements in piano and diction (English, French, German, and Italian).

Any deficiencies demonstrated by the placement examination scores must be removed early in the degree program. Application for candidacy and required examinations cannot be approved until deficiencies are removed. Thesis and dissertation projects may not be completed while preliminary examination deficiencies remain.

Results from the major-field examination serve as one basis for recommending specific course work in the program. The major-field examination in musicology includes essay questions, score analysis, and identification of terms. Conducting majors should be knowledgeable in areas of repertoire, score analysis, and conducting techniques. Performance majors are examined in the areas of technique, repertoire, stylistically informed performance, and pedagogy. Students enrolled in the master's degree

in Jazz Performance and Pedagogy must demonstrate knowledge of jazz theory and history, and jazz keyboard proficiency.

### College Teaching Area

For graduate students in music who intend to teach at the college level and who have had no prior college teaching experience, a teaching module of at least 6 hours of courses is recommended. This module can consist of professional education courses, music education courses, teaching-skills courses, or teaching practica. The teaching-area module is not normally used toward the minimum 30-hour course requirement for master's or DMA programs. Workshops, videotaping of students' teaching, observation, and consultation services are available through CU's excellent Graduate Teacher Program. Students who participate in this program are eligible to receive a graduate teacher certificate. For more information, visit [www.colorado.edu/gtp](http://www.colorado.edu/gtp).

### Financial Aid

In addition to the opportunities for financial aid described in the Graduate School section, the College of Music grants teaching assistantships and part-time instructorships to numerous graduate students each year. The assistantships and instructorships, which are considered one-quarter time, include both a stipend and the waiver of 5 or 6 credit hours of tuition each semester. There are also scholarships offered by the individual faculties, grants-in-aid given for various college-related responsibilities, and fellowships awarded through the Graduate School. All prospective students who have completed their applications by December 1 will automatically be considered for available scholarships, fellowships, and assistantships.

### English Language Requirements

A student who is noticeably deficient in the use of the English language may not obtain an advanced degree from the University of Colorado. Satisfaction of this requirement depends not so much upon ability to pass formal tests, although these may be required, as upon the consistent use of good English in all oral and written work.

### Graduate Auditions

Auditions are required for all performance and performance/pedagogy programs. A personal audition is strongly preferred, but students may be accepted into most programs by submitting a recorded audition. Note that some studios require a preliminary, recorded audition before a student may be invited to schedule an audition on campus. For specific information and audition dates, refer to the website ([www.colorado.edu/music/applying/gradapply/auditions.html](http://www.colorado.edu/music/applying/gradapply/auditions.html)) or contact the office of the associate dean for graduate studies at 303-492-2207 or [gradmusic@colorado.edu](mailto:gradmusic@colorado.edu).

### Master of Music

The major fields for this degree are composition, conducting, music theory, performance, and the combined major of performance/pedagogy. Conducting students may concentrate in choral, orchestral, or wind symphony/band. Performance and performance/pedagogy majors may concentrate in brass instruments, early keyboard, jazz, piano, percussion, organ, harpsichord, string instruments (including harp and guitar), voice, or woodwind instruments.

Major work in the conducting degrees includes advanced conducting, analytical studies, score reading, orchestration, arranging, conducting practica, and research and writing. In

music theory, course work and two thesis papers are required. In pedagogy, courses in the psychology of music learning, the pedagogy and literature of one's performing area, and a written thesis are required. In performance, students complete applied study, recitals, and courses that investigate the repertoire of their performance areas. All master's degree students are required to take a course in bibliographic research and 6 credits outside their major area.

Brass, conducting, percussion, string, voice, and woodwind majors are required to participate in a music ensemble. Committee chairs advise students concerning the appropriate choice of ensemble.

### Prerequisites

As noted in the Graduate School section, students should have completed undergraduate preparation equivalent to that expected for the bachelor's degree at this university. Normally this is a bachelor of music degree in the proposed area of concentration.

Before admission, composition majors should submit representative scores and recordings (CD format), and a list of completed compositions. Theory majors should submit a scholarly writing sample that demonstrates ability in critical analysis, appropriate research techniques, and skill in the cogent use of English. Performance majors must submit a repertoire list and arrange for an audition, or submit a non-returnable recording of their performance. Conducting majors must submit a videotape or DVD of their performance. Refer to "Graduate Auditions" above for further details.

### Program of Study

The master of music (MM) degree, which the Graduate School considers a Plan II program, requires a minimum of 30–32 semester hours of graduate course work, including thesis projects. Many students find it necessary to exceed this minimum in order to meet the musical and academic standards demanded by the MM qualifying examination. Outlines of specific programs may be obtained from the office of the associate dean for graduate studies in the College of Music and online ([www.colorado.edu/music/applying/gradapply/degrees.html](http://www.colorado.edu/music/applying/gradapply/degrees.html)).

Each student's program is directed by a three-member advisory committee headed by the major advisor (the student's major professor). A second member is chosen from the major area, and a third from outside the major area. (The major areas are music education, musicology, music theory, composition, and performance.) By the second semester of residence, the student should complete a tentative degree plan and obtain the approval of the advisory committee and the associate dean for graduate studies. Students must complete the master's degree within four years of matriculation into the program.

### Examinations

In addition to preliminary examinations, master's degree students in music must take the master's qualifying examination. The procedures, guidelines for registration, and deadlines for taking these examinations are announced by the Music Graduate Office.

### Recital/Thesis Requirements

The recital/thesis requirement for the MM in composition is the composition (during the period of graduate study) of several works of major proportion, at least one of which must receive public performance. For the major in conducting, the requirement is a public practicum and a performance-related or other

scholarly document. For the major in music preparation and theory, it is two thesis papers. For the major in performance, presentation of two public recitals constitute the requirement. For the major in performance and pedagogy, a full-length recital and a research document in pedagogy are required.

### Master of Music Education

The master of music education (MME) program addresses the professional development needs of music teachers in the field. Master of music education students are challenged to develop a greater understanding and mastery of music teaching-learning processes, to improve personal musicianship, and to become committed leaders within the music education profession.

#### *Prerequisites*

Applicants are expected to provide evidence of undergraduate preparation equivalent to that required for the bachelor of music education degree at this university. Applicants also must possess a music teaching certificate/license or agree to work toward a Colorado music teaching license. GRE scores are not required for admission, but can be helpful in determining merit-based financial aid. Individuals who wish to pursue music performance or conducting as their minor field must demonstrate at least senior-level proficiency on their particular medium, through an audition.

#### *Program of Study*

Students earning the MME degree must complete a minimum of 30 hours of course work, including 12 hours in music education, 12 hours in music, and 6 hours of electives in a specialization area or other areas of interest. Of the 12 hours in music, a two-hour course in bibliography and research is required as well as six hours of study in a minor area, which includes musicology, music theory, or performance (including conducting and jazz studies).

The music component of the degree should assist students in developing their musical knowledge and skills. One member of the student's graduate advisory committee should be from the minor area, and it is assumed that at least some part of the student's study is with that faculty member. All music studies must be at the 5000-level or above. Under special circumstances, up to 6 credit hours at the 4000-level may be applied to the open electives portion of the degree.

As a master of music education degree candidate, each student must produce a culminating paper that focuses on a topic of vital interest or importance. This paper may be developed as part of the requirements for a music education course or may take the form of a master's thesis. Culminating papers or theses are defended during final oral examinations.

Students typically complete the degree in two academic years, or one academic year plus two summers. Degree work must be completed within four years of the semester in which the student is accepted into a degree program and begins studies. Because most master's-level music education courses are offered in late afternoons, students who live within commuting distance can earn a significant portion of credit toward the degree while continuing to work full time.

### Dual Master's Degree Program

Students may apply for a dual master's degree that incorporates any two master's programs in the College of Music. They must be accepted into both programs through the normal application process and take the full complement of courses in the major area of each degree program. Nonthesis courses common

to both programs may be counted for each. A minimum of 45 credit hours must be earned.

### Professional Certificate in String Quartet Performance

The Professional Certificate in String Quartet Performance is designed to provide instruction and experiences for young artists who have already completed a master's degree or its equivalent in performance. Students are generally accepted into the certificate program as part of a pre-formed string quartet, which will apply for admission into the College of Music graduate program as a unit.

### Professional Certificate in Opera and Solo Vocal Performance

This program provides instruction and experiences for a select number of young artists, most of whom have already completed a master's degree in performance. Participants in the certificate program will concentrate significantly on the performance aspect of their work. This program is considered a path to a specialized career in solo vocal performance.

### Professional Certificate in Woodwind Performance

This program is designed to emphasize performance experiences for truly outstanding young artists who have already completed a master's degree or its equivalent in woodwind performance. The professional certificate is intended for students who plan on careers in performance and admission and is highly selective.

### Doctor of Musical Arts

The doctor of musical arts (DMA) is a professional degree for creative and performing students who possess the talent as well as the breadth of knowledge, background, outlook, and scholarly capacity requisite to a doctoral program. Fields of study are composition, instrumental conducting and literature, literature and performance of choral music, performance, and performance/pedagogy. Performance and/or performance/pedagogy concentration areas are brass instruments, guitar, harpsichord, organ, percussion, piano, string instruments, voice, and woodwind instruments. Outlines of specific programs may be obtained online at [www.colorado.edu/music/applying/gradapply/degrees.html](http://www.colorado.edu/music/applying/gradapply/degrees.html) and from the office of the associate dean for graduate studies.

#### *Prerequisites*

Entrance requirements include a master's degree in music or demonstrated background comparable to that of the master of music degree at this university. All graduate applicants must complete an audition, interview, or some other demonstration of their ability in the major field. If at all possible, a visit to the campus is strongly encouraged. As part of the application, composition majors should submit representative scores and recordings (CD format), and a list of completed compositions. Performance majors should submit a repertoire list and arrange for a personal audition and interview, if at all possible. (Some areas require applicants to send a pre-audition screening recording of their performance.) Conducting majors must submit a DVD of their performance. All DMA applicants must also submit a scholarly writing sample that demonstrates ability in critical thinking, appropriate research techniques, and skill in the cogent use of English. Full details concerning audition and application requirements may be found online ([www.colorado.edu/music/applying/gradapply/index.html](http://www.colorado.edu/music/applying/gradapply/index.html)).

### Program Requirements

The following program description supplements the requirements applying to all graduate students found in the Graduate School section and in the introductory section on Graduate Degree Programs in this College of Music section. Information on quality of work, credit by transfer, application for admission to candidacy, comprehensive examination, and final examination found under the PhD description is applicable to the DMA degree. DMA degree work must be completed within six years of first registration.

**Advisory Committee.** Each DMA program is directed by a five-member advisory committee headed by the major advisor, who is usually the student's main studio teacher. At least one member must hold the PhD degree.

**Residence Requirements.** The minimum residence requirement is six semesters of work beyond the attainment of an acceptable bachelor's degree. Two semesters of residence credit may be allowed for a master's degree from another institution of approved standing, but at least four semesters of residence credit, two of which must be consecutive in one academic year, must be earned for course work and/or dissertation work taken at this university.

Not more than one-half semester of residence credit may be earned in a summer session. Students must be registered full-time to earn residence credit. For employed students, only those with one-fourth time or less in work that does not contribute directly to their degree program may earn full residence credit.

**Continuous Registration.** After the residence requirements for the doctor of musical arts program have been satisfied, a student must enroll for fall and spring semesters of each year until attaining the degree. If a student has enrolled in all required dissertation courses but has still to complete the work, he or she should enroll in TMUS 8019 Precandidate for Doctor of Musical Arts Degree, or TMUS 8029 Candidate for Doctor of Musical Arts Degree, until the degree is completed.

**Degree Plan.** A degree plan approved by the advisory committee will be presented to the associate dean for graduate studies no later than the second semester of residence. The student's major professor is responsible for helping the student formulate this plan. The plan should include designated members of the student's doctoral committee, projected remedial and supporting course work, proposed dissertation projects, and tentative dates for the comprehensive and final examinations.

**Language Requirement.** Each DMA student must satisfy a foreign language requirement, and the one foreign language used to satisfy the requirement must be approved by the student's advisory committee. Additional language work is required for voice students. Advanced competence in music technology may be approved as an alternative to the foreign language requirement. Appropriate courses and projects are prescribed by the college's music technology faculty. International students whose native language is not English are exempt from the requirement.

**Course Requirements.** Students must take a minimum of 30 hours of course work, of which at least 18 hours are dissertation projects. Students take two doctoral topic classes, preferably one each in musicology and music theory; prerequisites are stipulated by the theory and musicology faculties. Some areas require specific course work prior to or in conjunction with work on dissertation projects. In other instances students may be advised to take course work in preparation for the comprehensive examination. Applied music instruction may be elected for the duration of the residency requirement.

Dissertation. The DMA dissertation consists of a specified number of performances, projects, and documents. The student's permanent advisory committee must approve all dissertation projects. Dissertation requirements for the various majors differ somewhat, and individual instances may require that the permanent advisory committee adjust dissertation requirements to the student's artistic and educational needs.

### Doctor of Philosophy

The doctor of philosophy (PhD) in music degree is offered through the Graduate School for students who seek a terminal degree with an emphasis on research. The two principal areas of study are music education and musicology (including ethnomusicology).

#### Prerequisites

Students applying to the PhD program should have a bachelor's degree or equivalent in a music field related to their intended area of study. Applicants for the PhD with an emphasis in music education should hold an MME degree. Letters of recommendation, representative research papers, and satisfactory scores on the GRE (the general test) are required elements of the student's application for the degree. Upon entrance to the degree program, students must pass the preliminary examinations and begin working toward basic requirements.

#### Music Transfer Credit

Graduate credit of high quality taken at another institution may be accepted for transfer once a student has established a satisfactory record of residence at CU. Transfer credit is limited to 21 semester hours where a grade of B- or higher was received. All requests for credit transfer must be approved by the chair of the respective faculty unit, the associate dean for graduate studies in music, and other university officers as specified on the transfer credit application form. Transfer credit will not affect the residency or dissertation credit-hour requirement.

#### Residence Requirement

The minimum residence requirement for the PhD is 6 semesters of full-time study beyond the attainment of an acceptable bachelor's degree. Two semesters of residence credit may be allowed for a master's degree from another institution of approved standing. At least 4 semesters of residence credit, two of which must be consecutive in one academic year, must be earned for work taken at CU-Boulder.

### Doctor of Philosophy—Musicology

For the musicology student, the doctor of philosophy in music degree is intended to emphasize research in music history, music theory, ethnomusicology, or some other aspect of music in culture. The musicology faculty encourages students entering the graduate program, whether from the bachelor's or master's level, to pursue the PhD, the benchmark of professional education within the field. A minimum of 30 semester hours in courses numbered at 5000 or above is required (although the minimum number is almost always exceeded). At least 4 doctoral seminars (7000 level) in musicology and music theory (3 plus 1, 1 plus 3, or 2 plus 2) must be taken at the University of Colorado at Boulder as part of this course work. Unless otherwise specified by departmental requirements, all courses at the 5000 level or above taken for the master's degree at the University of Colorado may be applied toward the doctoral degree. Up to 21 semester hours of graduate work taken at another institution

may be considered for transfer. The College of Music requires proficiency in two foreign languages appropriate to the student's program of study. Normally the language requirement is met by a translation examination scheduled twice a semester through the graduate music office.

### ***Dissertation Requirements***

A student must complete a total of at least 30 credit hours of dissertation credit (beyond course work), with not more than 10 of these hours in any one semester. Furthermore, not more than 10 hours of dissertation credit earned prior to a student's advancement to candidacy may be applied toward the required 30 credit hours. The dissertation itself should be an original and worthwhile contribution to knowledge in the field of musicology. It is expected that the student work closely with a major professor who will serve as the first reader and critic before it is submitted to the other dissertation committee members.

### **Doctor of Philosophy—Music Education**

The doctor of philosophy degree in music, with music education as a field of specialization, is offered through the Graduate School for students who demonstrate both superior commitment to the music education profession as well as scholarly potential. This degree program requires that individuals think abstractly, generalize knowledge, apply research results to areas of specialization, and communicate effectively in both oral and written forms. Course work emphasizes the study of historical, philosophical, psychological, and sociological foundations of music education; the theoretical and pedagogical principles of music teaching and learning; curriculum development; testing and assessment; and research techniques. Graduates typically pursue careers in music education at the college level or supervisory positions in elementary and secondary schools.

### ***Course Work***

A minimum of 45 semester hours of courses numbered 5000-level or above (15 of which may be transferred from the master's degree) and a minimum of 30 hours of doctoral dissertation credit are required for the PhD degree.

### ***Dissertation Requirements***

A dissertation based on original investigation, demonstrating mature scholarship, must be completed by each candidate. Following the successful completion of the comprehensive examination, the student designates a dissertation committee, develops a dissertation prospectus, and presents it to the committee for approval. After the dissertation has been accepted, a final oral examination on the dissertation and related topics is conducted by the student's dissertation committee.

## **Faculty—College of Music**

DANIEL SHER, dean; professor (piano). BM, Oberlin College Conservatory of Music; MS, Juilliard School; EdD, Columbia University.

PHILIP AAHOLM, professor emeritus

KWASI AMPENE, associate professor (ethnomusicology). Diploma, University of Ghana; MM, West Virginia University; PhD, University of Pittsburgh.

JAMES R. AUSTIN, associate dean for undergraduate studies, professor (music education). BME, University of North Dakota; MAEd, PhD, University of Iowa.

LINA BAHN, assistant professor (violin). BM, Juilliard School; MM, University of Michigan; DMA, Indiana University.

GRETCHEN HIERONYMUS BEALL, professor emerita.

MARGARET BERG, associate professor (music education). BS, Case Western Reserve University; BM, Cleveland Institute of Music; MME, University of Cincinnati; PhD, Northwestern University.

GIORA BERNSTEIN, professor emeritus.

DANA BIGGS, assistant director marching band (instructor). BM, University of Kentucky, Lexington; MM, Eastern Kentucky University, Richmond; DMA, University of Kentucky, Lexington.

JAMES BRODY, associate professor (oboe). BM, Ohio State University; MM, Indiana University.

STEVEN M. BRUNS, associate dean for graduate studies, associate professor (theory/composition). BME, Northern State College, Aberdeen, SD; MM, PhD, University of Wisconsin, Madison.

JOEL BURCHAM, assistant professor (voice). BM, Southern Illinois University; MM, University of Arkansas—Fayetteville; DMA, ABD, University of Wisconsin—Madison.

CARLO CABALLERO, associate professor (musicology). BA, Pomona College; PhD, University of Pennsylvania.

NICHOLAS CARTHY, associate professor (opera). Studies at the Guildhall School of Music and the Mozarteum Salzburg.

PHILIP CHANG, instructor (music theory). BA, Florida State University; MA, PhD, Eastman School of Music.

JOAN CATONI CONLON, professor emerita.

PETER COOPER, instructor (oboe). BM, Northwestern University.

ANDREW COOPERSTOCK, professor (piano). BM, University of Cincinnati; MM, Juilliard School; DMA, Peabody Conservatory of Music.

DAVID CORBUS, instructor (jazz guitar). BM, New York University.

ALEJANDRO CREMASCHI, associate professor (piano pedagogy). BA, University of Maryland, Baltimore County; MM, DMA, University of Minnesota, Twin Cities.

JOHN DAVIS, associate professor (jazz studies). BA, Metropolitan State College; MM, University of Denver; DA, University of Northern Colorado.

JOHN DRUMHELLER, instructor (theory/composition). BME, Montana State University; MM, DMA, University of Colorado at Boulder.

J. MICHAEL DUNN, assistant professor (tuba). BS, Tennessee Technological University; MM, DMA, Arizona State University.

CHARLES EAKIN, professor emeritus.

ERIKA ECKERT, associate professor (viola). BM, Eastman School of Music.

OLIVER ELLSWORTH, professor emeritus.

AKIRA ENDO, professor emeritus.

PAUL ERHARD, associate professor (double bass). BM, Eastman School of Music; MM, DMA, Juilliard School.

ELIZABETH FARR, associate professor (organ, harpsichord). BM, Stetson University; MM, Juilliard School; DMA, University of Michigan.

ROBERT FINK, dean emeritus and professor emeritus.

JOHN GALM, professor emeritus.

JUDITH GLYDE, professor (cello). BM, Hartt College of Music; MM, Manhattan School of Music.

BRADLEY M. GOODE, associate professor (jazz trumpet). BM, University of Kentucky; MM, DePaul University.

LUIS GONZALEZ, professor emeritus.

LARRY GRAHAM, professor emeritus.

JOHN GUNTHER, assistant professor (jazz studies, saxophone). BM, MA, Berklee College of Music; MA, University of Miami.

KEVIN HARBISON, professional exempt (recording technology). BM, Cleveland Institute of Music.

JANET HARRIMAN, instructor (harp). BM, College of Wooster; MM, Cleveland Institute of Music.

KUNIAKI HATA, professor emeritus.

DEBORAH HAYES, professor emeritus.

ALLEN HERMANN, instructor (jazz trombone).

HSING AY HSU, instructor (artistic director, Pendulum: New Music at CU). BM, Juilliard School of Music; MM, Yale School of Music.

YOSHIYUKI ISHIKAWA, professor (bassoon). BME, MM, Northwestern University; DMA, University of Michigan.

MAMI ITASAKA, instructor (assistant director, Japanese ensemble). BA, English literature, Komazawa University, Tokyo.

DENNIS JACKSON, professor emeritus.

JEFF JENKINS, instructor (jazz piano).

CHRISTINA JENNINGS, assistant professor (flute). BM, MM, Juilliard School; DMA, Rice University.

LAWRENCE KAPTEIN, associate professor (choral). BME, Willamette University; MA, Portland State University; DMA, University of Southern California.

WILLIAM KEARNS, professor emeritus.

JAY KEISTER, associate professor (ethnomusicology). BA, California State University, Fullerton; MA, PhD, University of California, Los Angeles.

DANIEL KELLOGG, assistant professor (composition). BM, Curtis Institute of Music; MM, MMA, Yale School of Music.

DAVID KOREVAAR, associate professor (piano). BM, MM, DMA, Juilliard School.

DAWN KRAMER, instructor. BA, University of Colorado at Boulder.

IMADE LASMAWAN, instructor (director, gamelan ensemble). SMKar, Skar, Indonesian Traditional Performing Arts College.

JONATHAN LEATHWOOD, instructor (guitar). BM, King's College; studies at University of Denver, University of Surrey.

DORIS PRIDONOFF LEHNERT, professor (piano). Attended University of Southern California, Juilliard School, and University of Connecticut.

OSWALD LEHNERT, professor (violin, viola). Special Studies, Chicago Musical College; Juilliard School, University of Connecticut.

DAPHNE LEONG, associate professor (theory). BM, University of Saskatchewan; MA, MM, PhD, Eastman School of Music.

GARY LEWIS, director of orchestras; professor. BME, University of Oklahoma; MM, Texas Tech University.

ALAN LUHRING, professor emeritus.

REBECCA MALOY, associate professor (musicology). BM, University of Illinois, Campaign-Urbana; MM, PhD, Cincinnati College Conservatory of Music.

PATRICK MASON, professor (voice). BM, Peabody Conservatory of Music, MM, University of Nebraska at Lincoln.

KEVIN McCARTHY, professor emeritus.

MARGARET McDONALD, assistant professor (collaborative piano). BM, MM, University of Minnesota, Twin Cities.

ALLAN McMURRAY, director of bands; Robert and Judith Charles Professor (trumpet). BA, California State University, Long Beach; MM, University of Wisconsin. Additional study, University of Michigan.

PETER MIKSZA, assistant professor (music education). BM, College of New Jersey; MME, PhD, Indiana University.

MARTINA MIRANDA, assistant professor (music education). BA, Trinity International University; MA, San Francisco State University; PhD, Musical Arts in Music Education, Arizona State University.

MUTSUMI MOTEKI, associate professor (vocal coach, accompanist). BA, Kunitachi College of Music; MM, Westminster Choir College; DM, University of Michigan.

TOM MYER, associate professor (saxophone). BS, University of Wisconsin-LaCrosse; MM, North Texas State University.

ALEXANDRA NGUYEN, assistant professor. BS, McGill University; DMA, MM, Eastman School of Music.

CARTER PANN, assistant professor (composition/theory). BM, Eastern School of Music; MM, DMA, University of Michigan.

PATTI PETERSON, associate professor (voice). BM, Salem College; MM, DMA, University of Colorado at Boulder.

DAVID PINKOW, professor emeritus.

THOMAS RIIS, director, American Music Research Center; professor (musicology). BA, Oberlin College; MA, PhD, University of Michigan.

FRANCISCO RODRIGUEZ, instructor.

MATTHEW ROEDER, assistant professor, associate director of bands. BM in Music Education, Miami University; MM, Music Education/Conducting, Peabody Conservatory of Johns Hopkins University; DMA (wind conducting), University of Colorado at Boulder.

PAUL ROMAINE, instructor (jazz, drum set). BS, University of Colorado Denver.

BRENDA ROMERO, associate professor (musicology, ethnomusicology). BM, MM, University of New Mexico; PhD, University of California, Los Angeles.

BARBARA KINSEY SABLE, professor emerita.

TERRY SAWCHUK, associate professor (trumpet). BM, MM, University of Michigan.

F. WAYNE SCOTT, professor emeritus.

DANIEL SILVER, associate professor (clarinet). BM, Northwestern University; MM, University of Michigan.

MARK SIMON, instructor (jazz bass).

JULIE SIMSON, professor (voice). BM, Western Michigan University; MM, University of Illinois.

JEREMY SMITH, associate professor (musicology). BA, Washington College; MFA, University of California, Irvine; PhD, University of California, Santa Barbara.

ROBERT SPILLMAN, professor emeritus.

WILLIAM STANLEY, associate professor (trombone). BME, University of Kansas; MM, DMA, University of Illinois.

MICHAEL THEODORE, associate professor (theory/composition). BA, Amherst College; MM, Yale School of Music; PhD, University of California, San Diego.

MICHAEL THORNTON, assistant professor (horn). BM, Temple University; additional studies at Manhattan School of Music and Juilliard School.

RICHARD TOENSING, professor emeritus.

DOUGLAS WALTER, professor (percussion). BM, University of North Texas; MM, University of Michigan; DMA, Temple University.

KEITH WATERS, associate professor (theory/composition). BM, University of North Carolina, Greensboro; MM, New England Conservatory of Music; PhD, Eastman School of Music.

SUSAN WILLIAMSON, assistant professor (music education). BME, Ball State University, MME, University of Colorado at Boulder; PhD, University of Washington.

CHARLES WOLZIEN, professor emeritus.

CHRIS ZEMLIAUSKAS, instructor (vocal coach, accompanist). BM, Ithaca College; MM, University of Minnesota.

### Takács Quartet

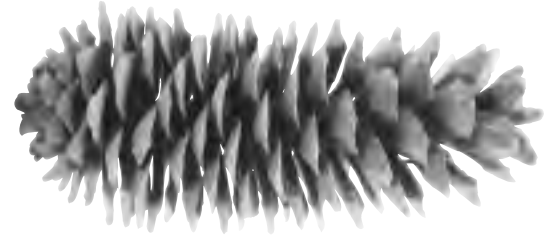
EDWARD DUSINBERRE, artist in residence (violin). Performer's Diploma, London Royal College of Music; Advanced Certificate, Juilliard School.

ANDRAS FEJER, artist in residence (cello). Music Diploma, Franz Liszt Academy of Music, Budapest.

KAROLY SCHRANZ, artist in residence (violin). Music Diploma, Franz Liszt Academy of Music, Budapest.

GERALDINE WALTHER, artist in residence (viola). BM, Curtis Institute; MM, Manhattan School of Music.

# Other Academic Programs



## Continuing Education and Professional Studies

The mission of the Division of Continuing Education and Professional Studies is to provide quality, innovative, lifelong learning opportunities to a diverse student population by extending the educational resources of the University of Colorado at Boulder. A variety of credit courses, noncredit courses, certificate programs, and seminars is offered through Continuing Education, which also administers CU-Boulder's summer session. Only university-approved faculty teach in Continuing Education programs.

The office is located at 1505 University Avenue in Boulder, 303-492-5148 (or 1-800-331-2801). The fax number is 303-492-5335, and the website is [conted.colorado.edu](http://conted.colorado.edu).

### Boulder Evening Credit Program

Offered in conjunction with CU-Boulder's academic departments, the Boulder Evening Program provides credit courses in the evening on the Boulder campus. These affordable, smaller-sized classes are provided through various departments including anthropology, communication, economics, English, film studies, art and art history, geography, mathematics, philosophy, psychology, sociology, Spanish, theatre, and more.

### Independent Learning Program

The Independent Learning Program offers online and print correspondence courses representing and approved by more than 20 departments on campus. Term-based courses follow a traditional semester schedule and allow for rich interaction with the instructor and other classmates. Self-paced courses offer students the flexibility of progressing through the course at their own pace, and to finish in less than a full semester or take up to a full year.

### Applied Music Program

The Applied Music Program offers students the opportunity to earn CU credit for beginning or continuing music lessons on guitar, piano, voice, organ, winds, brass, drums, percussion, or strings. Instruction is available in individual or group sessions depending on instrument.

### Individualized Instruction

Individualized Instruction provides an opportunity for students to receive credit for university courses by meeting with faculty members outside the regular classroom setting. This option may be used when the student cannot reasonably be expected to enroll in the main campus course.

## Center for Advanced Engineering and Technology Education (CAETE)

CAETE, a partnership between the College of Engineering and Applied Science and the Division of Continuing Education and Professional Studies, serves as the distance learning and professional studies arm of the college. CAETE provides graduate engineering and technical education and professional development for practicing engineers and managers of technology. Course sequences may lead to a master's degree in aerospace engineering, computer science, electrical and computer engineering, engineering management, or telecommunications. Elective courses are also offered in civil/environmental and mechanical engineering. Graduate certificates and short courses are available in some fields. CAETE also provides ongoing access to over 100 pre-recorded courses via its virtual library. These courses are available for academic course work, rental, or purchase by companies for in-house training.

## ACCESS and High School Concurrent Programs

In conjunction with CU-Boulder academic departments, ACCESS (Available Credit Courses for Eligible Special Students) enables nondegree students to enroll in Boulder main campus undergraduate and graduate credit courses after most degree-seeking students have registered. Colorado high school juniors and seniors interested in the challenge of university course work may enroll in ACCESS as part of the High School Concurrent Program. In addition to earning college credit, students may also earn credit toward high school graduation requirements.

## Extraordinary and Contract Credit Programs

Through Continuing Education, academic departments can offer special courses that target audiences both on and off campus and provide academic credit for those offerings. Once a course proposal is submitted, Continuing Education coordinates the approval process and provides administrative support to the course initiator. Programs initiated from outside the university community are also considered for approval as well as noncredit and certificate programs.

## Personal Enrichment Program

These noncredit classes are designed to meet students' personal enrichment and professional development goals. The program offers classes in science, arts, foreign languages, writing, theatre, and more.

## Executive Education Programs

Executive Education Programs is a partnership between the Leeds School of Business and the Division of Continuing Education and Professional Studies, offering certificate and custom programs. Executive Education offers professional development opportunities through programs such as the 50 for Colorado program for business professionals and the CU Business Intensive Certificate (CUBIC), which provides an intensive exposure to business education for nonbusiness undergraduate students.

## International English Center

The International English Center (IEC) offers language learning, cultural adjustment, and academic preparation programs for international students planning to matriculate at universities and for members of the campus and local community with limited English proficiency. The IEC also contracts with corporate groups to provide language training and professional development courses.

## Outreach: Reaching Off Campus and into Communities

Extending educational opportunities to the citizens of Colorado is a vital part of the university as well as the mission of the Division of Continuing Education and Professional Studies. CU-Boulder faculty and students provide a wide variety of outreach programs to communities across Colorado. These programs extend the scholarship of the faculty and the educational resources of the university and serve various educational, social, economic, and cultural needs. The division annually supports these efforts by designating funds for the CU-Boulder Outreach Committee along with contributions from the offices of the chancellor and the provost. The committee awards funding to faculty projects designed specifically for external audiences that highlight faculty research, creative work, and teaching. Projects feature an extensive range of disciplines, including everything from history, dance, and musical arts to physics, math, and engineering.

## Summer Session and Maymester at CU-Boulder

Summer Session offers over 500 campus courses and enrolls more than 7,500 students in a relaxed, comfortable learning environment. Courses are available to students who wish to enhance or accelerate their academic progress. Courses are also open to students visiting from other colleges, teachers, high school students, or others interested in pursuing their professional development or enrichment.

Maymester is a special three-week Summer Session term immediately following the end of spring semester. It provides intense, accelerated courses for those who need academic credits in an abbreviated time period.

## Dean

ANNE HEINZ, dean of the Division of Continuing Education and Professional Studies; associate vice chancellor for summer session. BS, Southern Illinois University; EdM, PhD, University of Illinois, Urbana-Champaign.

ARMANDO PARÉS, assistant dean of the Division of Continuing Education and Professional Studies. BS, University of Colorado at Boulder; MPA, University of Colorado Denver.

## Leadership, Certificate in the Study and Practice of

The certificate program in leadership development seeks to expand a students' capacity to be effective in leadership roles and opportunities during their time at CU and in their future professions. The program enhances a student's self-awareness, systemic thinking, creativity, and problem-solving skills. This development unfolds over a student's undergraduate career and is maximized by a variety of courses and experiences that challenge, support, and provide students with increased understanding of what they are learning and how it fits into the larger world. The Certificate in the Study and Practice of Leadership integrates the variety of experiences into a context that is likely to be useful when undertaking new leadership roles and responsibilities. The training is an ongoing process, embedded in experiences and unfolding over time, facilitated by faculty and staff skilled at weaving those experiences and courses in connected and meaningful ways.

A leadership certificate can enhance the undergraduate experience and better prepare students both as citizens and leaders in whatever profession they might seek to enter. The program recognizes the need for individuals to take leadership roles in all professions and sectors of society. It is the belief of the program that leadership can be learned in formal classes, community-based leadership opportunities, mentoring and internship settings, as well as through a range of collaborative leadership activities.

For more information about the Certificate in the Study and Practice of Leadership, see [www.colorado.edu/chancellors/irap/lccert.html](http://www.colorado.edu/chancellors/irap/lccert.html).

## Program Requirements

This certificate program has an 18-credit-hour requirement comprised of lower- and upper-division courses. Undergraduate students working toward this certificate are usually affiliated with one of the following academic programs:

- Leadership Program at Williams Village (WV)
- Presidents Leadership Class (PLC)
- INVST Community Studies (INVST)
- ROTC programs

Each of these programs has defined particular academic courses within their programs to be certificate requirements. Students may also apply elective courses from other disciplines on campus toward the total credits required for the certificate. Students in the leadership programs at WV, PLC, and INVST programs are required to do an internship that is overseen by one of the program directors. Students in all four programs participate in either a four-credit-hour capstone course during their senior year or a capstone project mentored by their academic program director. To qualify for the certificate, students must maintain a 3.000 GPA in the required course work.

## Leadership Program at Williams Village

For certificate requirements, see The Leadership Program at Williams Village in this section.

## Presidents Leadership Class

PLC certificate requirements are listed under the Presidents Leadership Class in this section.



## INVST Community Studies

Selection criteria govern admissions.

Four required theory courses plus community based service-learning experiences (18–24 credits).

Minimum of 15 hours of upper-division courses.

INVS 4932 Senior Capstone Course and/or Project.

Minimum total credit hours: 18 with a 3.000 GPA

## Reserve Officer Training Corps Programs

Admission to CU-Boulder and ROTC required. (Some courses are open to all CU-Boulder students.)

Required summer field training program(s).

4–8 required courses in ROTC (12–22 hours).

Minimum of 15 hours of upper-division courses.

Additional courses from Recommended Leadership Courses to complete the 18-hour requirement.

Senior Capstone Course and/or Project (4 hours).

Minimum total credit hours: 18 with a 3.000 GPA.

## The Capstone Course and Project

The capstone project, INVS 4932, is designed to synthesize the leadership work students have completed during their undergraduate studies. Together with the program's faculty, students design a format that demonstrates their cumulative learning and development and reflects their leadership abilities. Like oral examinations at the graduate level, these projects are an opportunity for students to present a body of work that demonstrates what they have learned as they address some of the critical questions associated with leadership development and their role as a leader in the 21st century.

In the capstone course, Critical Issues in Leadership, LDSP 4010 or PRLC 4010, students explore leadership issues across disciplines. Leadership education is multi-disciplinary and students need to know how to assess research and writing from different perspectives. Students read, discuss, and write critical evaluations of contemporary leadership theory from ethical, military, community building, and business perspectives.

## Internships

Internships are an agreed-upon experience in a work setting that is driven by intentional learning goals and accompanied by sustained reflection. The internship provides students with an opportunity to apply the skills and knowledge gained through their leadership studies. During the semester students use the concepts and theories learned in the classroom to analyze and understand the host organization. In addition, students are asked to reflect on the complexities of leadership and the personal challenges that they face in practicing and refining their own leadership skills.

## The Leadership Program at Williams Village

The Leadership Program at Williams Village houses two academic programs for students with an interest in leadership studies: the Ethnic Living and Learning Community Leadership Studies Program (ELLC) and the Chancellor's Leadership Studies Program (CLSP).

## Admission and Enrollment

Students select one of the leadership programs at Williams Village during the housing application process prior to beginning their freshman year. When students choose Williams Village as their residence hall they are given the option to enroll in one of these programs. Most participants reside at Williams Village.

## The Ethnic Living and Learning Community Leadership Studies Program

The Ethnic Living and Learning Community Leadership Studies Program (ELLC) offers students a multicultural living and learning experience and the opportunity to study leadership from a multicultural and global perspective. Students are required to take a 3-credit-hour leadership course and the ELLC Practicum each semester of their freshman year. In these courses, students explore their roles and responsibilities in society including the moral and ethical dimensions of leadership. Students also learn about contemporary issues related to leadership and take part in activities that develop teamwork, ethical decision making, and problem solving. Credits earned from these courses may be applied toward graduation as well as a Certificate in the Study and Practice of Leadership.

<i>ELLC Curriculum</i>	<i>Semester Hours</i>
ELLC Practicum (1 credit each semester of freshman year) . . . . .	2
LDSP 1000 The Foundations of 21st Century Leadership (fall) . . . . .	3
LDSP 2400 Understanding Privilege and Oppression in Contemporary Society (spring) . . . . .	3
LDSP 2910 Field Practicum . . . . .	1
LDSP 3100 Multicultural Leadership: Theories, Principles and Practices . . . . .	3
LDSP 4010 Critical Issues in Leadership . . . . .	4

## Fees and Scholarship Opportunities

There is a \$725 program participation fee for the freshman year. Some scholarships to cover the fee are available for students with financial need. A LEAD Alliance scholarship of \$1,500 per year is also available to qualifying ELLC students. Additional information about this program can be found at [www.colorado.edu/chancellorsrap](http://www.colorado.edu/chancellorsrap).

## The Chancellor's Leadership Studies Program

The Chancellor's Leadership Studies Program examines the academic foundations of leadership and engages students in practical applications of leadership through simulations and class projects. Utilizing an experiential learning model, students learn the basics of decision making, problem solving, dialogue skills, ethical reflection, and the abilities needed to lead in a global and multicultural world. Students take a required 3-credit-hour leadership course fall semester and must take at least one CLSP course in the spring. Credits earned from these courses may be applied toward graduation as well as a Certificate in the Study and Practice of Leadership.

<i>CLSP Curriculum</i>	<i>Semester Hours</i>
LDSP 1000 The Foundations of 21st Century Leadership (fall) . . . . .	3
LDSP 1571 Topics in Leadership . . . . .	1
LDSP 2400 Understanding Privilege and Oppression in Contemporary Society (spring) . . . . .	3
LDSP 2910 Field Practicum . . . . .	1
LDSP 3100 Multicultural Leadership: Theories, Principles and Practices . . . . .	3
LDSP 4010 Critical Issues in Leadership . . . . .	4

## Fees and Scholarship Opportunities

There is a \$725 program participation fee for the freshman year. Some scholarships to cover the fee are available for students with financial need. Additional information about this program can be found at [www.colorado.edu/chancellorsrap](http://www.colorado.edu/chancellorsrap).

## Certificate in the Study and Practice of Leadership

ELLC and CLSP students who complete 10 credits of approved lower-division courses and 8 credit hours of approved upper-division courses with a 3.000 GPA as well as a pre-approved supervised internship are eligible to earn a Certificate in the Study and Practice of Leadership. The certificate is comparable to a minor in leadership studies and is noted on a student's transcript at graduation.

<i>Required Courses</i>	<i>Semester Hours</i>
<b>Freshman Year</b>	
LDSP 1000 The Foundations of 21st Century Leadership . . . . .	3
LDSP 2400 Understanding Privilege and Oppression in Contemporary Society . . . . .	3
Students must take 2 credits from the following courses. These classes are repeatable for credit:	
LDSP 1561 Compassionate Leadership and Mindfulness . . . . .	1
LDSP 1571 Topics in Leadership . . . . .	1
LDSP 2910 Field Practicum . . . . .	1
<b>Sophomore Year</b>	
One approved lower division elective . . . . .	3
<b>Junior Year</b>	
LDSP 3100 Multicultural Leadership: Theories, Principles and Practices . . . . .	3
One approved upper-division elective . . . . .	1-3
Internship—can be completed during academic year or during the summer.	
<b>Senior Year</b>	
LDSP 4010 Critical Issues in Leadership . . . . .	4

## Norlin Scholars Program

The Norlin Scholars Program, begun in fall 1999, offers a range of educational benefits and financial incentives for outstanding students. The Norlin Program, named after a distinguished former president of the University of Colorado, includes a total of approximately 125 students.

Norlin scholars accepted as first-year students receive a four-year award, contingent upon fine academic progress. University juniors (either continuing students at CU-Boulder or transfer students) receive a two-year award.

Norlin scholars are encouraged to shape an enriched educational experience tailored to fit their interests and goals in any of CU-Boulder's undergraduate colleges and schools.

Some of the benefits of the program include:

- Small, interdisciplinary seminars, some of which fulfill arts and sciences core curriculum requirements. Whether 3-credit core classes or 1-credit electives, Norlin courses appeal to students from all colleges and disciplines and encourage critical engagement with a wide range of issues.
- Individualized advising and guidance toward creating an enriched education through honors courses, internships, study abroad, and more.
- Research and creative opportunities with faculty that augment the classroom experience and enhance students' academic credentials.
- Academic, cultural, and social experiences shared in a community of creative, intellectually engaged peers.

## Financial Information

Each Norlin Scholar receives a merit-based award of \$3,000 per year. Students who need additional financial assistance should complete the FAFSA (Free Application for Federal Student Aid).

## Applying to the Program

A flexible selection system ensures that students with many different interests and talents are accepted as Norlin Scholars. Students may apply either as high school seniors (to enter the program as incoming first-year students) or as second-semester sophomores in college (to enter the program as juniors). Colorado residents as well as out-of-state and foreign students are eligible.

Applicants must demonstrate exceptional achievement or creativity in their academic work or other areas.

All applicants should complete the special Norlin Scholars application form, write their individual essay and submit these pieces in a single application packet. Application forms can be downloaded directly from the website at [www.colorado.edu/norlinscholars](http://www.colorado.edu/norlinscholars).

The deadline for receipt of the application materials is listed on the website. For first-year students and transfer students, the campus's standard application form must also be submitted separately to the Office of Admissions.

## Preprofessional Programs

Preprofessional advising resources have been developed at CU-Boulder to help undergraduate students and previously graduated students prepare for later study at professional schools. Except for prejournalism, CU-Boulder does not offer preprofessional undergraduate majors or degrees. Completion of preprofessional prerequisites does not guarantee later admission to a professional school. However, preprofessional advisors are well-equipped to provide information about professional schools within Colorado and beyond, and can help students to prepare well for later professional study.

## Prehealth Programs

Students can prepare to enter the undergraduate professional health science program at the Anschutz Medical Campus of University of Colorado Denver in the area of nursing by taking courses on the Boulder campus.

Students whose goals include entering the medical, dentistry, physical therapy, physician assistant, pharmacy, or public health programs and schools at the University of Colorado Denver, or the veterinary medicine or occupational therapy programs at Colorado State University in Fort Collins, can complete any undergraduate major at CU-Boulder. In most cases, these students are required to complete a baccalaureate degree before entering professional school. In fact, a baccalaureate degree is recommended for most health professions.

At the time of application to a professional school, students are judged on several factors, including performance in undergraduate courses. For this reason, no required course may be taken on a *pass/fail* basis. Some fields require specific preprofessional examinations before application. For most fields, interviews are an essential part of the application process.

In all cases, admission committees are concerned with students' compassion, coping, and decision-making abilities, intellectual capabilities, realistic self-appraisal, sensitivity in interpersonal relations, and staying power (physical and motivational). In addition to formal course work, students should have experience in people-related activities (especially those related to their field of choice), so they can be more certain of their motivation for health careers. Also, health-related activities expose premed and other health science hopefuls to various patients and illnesses. The health professions require, or strongly recommend, such experience.

Some of the professional programs at the Anschutz Medical Campus give preference to Colorado residents and residents of WICHE (Western Interstate Commission on Higher Education) states; interested students should check with individual programs for specific policies. Students from other states usually can obtain at CU-Boulder the preprofessional courses required by their state schools, but should check with those schools in advance. Students are encouraged to apply to their state school, as well as to other public and private professional schools, to increase their chances of gaining acceptance to the professional program of their choice.

During the preprofessional years, personal intellectual development leads many students to change professional goals. Since there are usually more applicants for these programs than there are spaces available, many students need to pursue alternative goals. Under these circumstances, students should plan college programs to give themselves the greatest flexibility in considering other vocations.

Advising for preprofessional study in the health sciences is conducted through the Preprofessional Advising Office in the University Club. Check the prehealth advising website at [www.colorado.edu/aac/prehealth.html](http://www.colorado.edu/aac/prehealth.html) for information on prerequisite courses, events, volunteer opportunities, student prehealth organizations, applications, and many other useful resources. Students should attend a prehealth advising session at orientation and then schedule an appointment with a prehealth advisor ([aac.colorado.edu](http://aac.colorado.edu)) early in their undergraduate careers to help plan course work and extracurricular experience in preparation for applying to programs of their choice. CU-Boulder also offers an extensive array of workshops and informational meetings, practice interviews, a fall speaker series, and a spring Health Professions Information Day.

## Other Preprofessional Programs

### *Prejournalism*

A specific prejournalism and mass communication option is offered at CU-Boulder in the College of Arts and Sciences. Students complete two prerequisite courses while working toward arts and sciences core curriculum requirements. See the School of Journalism and Mass Communication for more information.

### *Prelaw*

Students who plan to apply to law school upon completing their baccalaureate degree do not have to complete any specific requirements for admission to law school. Instead, they should major in the discipline that best suits their intellectual interests and talents. Prelaw students should seek a rigorous and broad-based education that will ensure them a fundamental understanding of American society and its institutions. Students should become familiar with mathematical analysis and scientific reasoning, and develop excellent oral and written communication skills.

Prelaw advising is available in the Preprofessional Advising Center. In addition, there are faculty members who have special interest and expertise in the theoretical and practical aspects of the law and judicial systems. These faculty advisors are available for consultation with students on the CU-Boulder campus. Contact the Preprofessional Advising Center in Old Main 1B-90 for more information.

## Presidents Leadership Class

The Presidents Leadership Class (PLC) is a specially designed academic curriculum that focuses on leadership development, personal development, and community service initiatives. Skills

are developed in an interdisciplinary, experiential environment through exposure to government, education, the humanities, business, and science. Students from all of the schools and colleges participate in the Presidents Leadership Class curriculum as a part of their regular course work.

The Presidents Leadership Class is a program of CU-Boulder and the Presidents Leadership Institute, and is overseen by a Board of Trustees representing the Colorado business, educational, nonprofit, and governmental communities.

## Admission and Enrollment

Admission to the Presidents Leadership Class is considered one of the highest honors awarded to incoming University of Colorado at Boulder students. Presidents Leadership Class scholars are admitted prior to the beginning of their first year. Selection criteria include academic excellence, a demonstrated commitment outside of self, demonstrated leadership potential, and uniqueness of contribution. Each year, 50 first-year scholars are enrolled, comprising both Colorado residents and nonresidents. A separate admission application must be obtained from the PLC office and returned prior to February 1. Applications may be obtained by visiting the website at [www.presidentsleadershipclass.org](http://www.presidentsleadershipclass.org) or by calling the PLC office at 303-492-4PLC.

Only students who are accepted into the Presidents Leadership Class are eligible to enroll in PLC courses. Students receive arts and sciences core credit in ideals and values for PRLC 1810 Ethical Leadership, core credit in contemporary societies for PRLC 1820 Community Issues in Leadership, and core credit in upper-division critical thinking for LDSP 4010 Leadership Capstone.

## Academic Program

Although there are many unique aspects of each leadership situation, leaders generally follow three basic steps when faced with a leadership situation: 1) try to get a read on the existing situation, 2) set a strategy to achieve a desired outcome, and 3) execute the strategy.

This fundamental human process—read, set, execute—has strong roots in basic psychological processes (i.e., stimulus, thought, response), but the steps can happen with varying degrees of quality. Because PLC's mission is to develop extraordinary leaders, it examined the differences in quality between the read-set-execute process ordinary leaders use and the read-set-execute process that extraordinary leaders use. Research determined that there are different routes to ordinary leadership and extraordinary leadership.

Extraordinary leaders need to read situations with insight, generate incisive strategy, and then execute with stunning results. The PLC Strategic Academic Plan is built upon developing six core leadership skills: information literacy, critical thinking, applied quantitative ability, writing, oratory, and group process. The six skills executed in an integrative manner provide the key fundamentals for scholars to read, set, and execute in an extraordinary manner.

For more information on the PLC Academic Plan and the research behind it, go to [www.presidentsleadershipclass.org](http://www.presidentsleadershipclass.org).

### **Required Courses:**

- PRLC 1810 Ethical Leadership
- PRLC 1820 Community Leadership
- PRLC 2810 Multilevel Leadership
- PRLC 3810 Global Leadership
- PRLC 4010 Leadership Capstone

### *University of Colorado at Boulder Leadership Certificate*

The University of Colorado at Boulder offers a certificate in the Study and Practice of Leadership. The certificate is comparable to a minor in leadership studies and is permanently marked on the student's transcript to certify that he or she has completed a focus in leadership studies at the undergraduate level.

Certificate requirements are as follows:

- Complete a minimum of 12 credit hours of PRLC courses during year one and two of the program: PRLC 1810, PRLC 1820, PRLC 2820, PRLC 3810
- Complete a minimum of 4 credit hours of upper-division PRLC course work: LDSP 4010.
- Complete 3 additional credit hours of approved upper-division course work outside of PLC. Approved courses are listed at [www.colorado.edu/chancellorsrap/lcelectives.html](http://www.colorado.edu/chancellorsrap/lcelectives.html) and a student may also petition to have an unlisted course accepted.
- Participation in practica and/or internships. These may be built into courses or conducted outside of courses.
- Receive an overall 3.000 average GPA for all required Leadership Certificate courses.

### Scholarship Programs and Opportunities

PLC scholars receive a merit-based scholarship of \$1,000 to over \$12,000 (dependent upon participation). Scholars must enroll in PRLC course work to maintain their scholarship.

Scholars are also eligible to be selected for a variety of other merit-based scholarships only available to PLC students, including the FirstBank Colorado Scholarship Fund (base scholarship of \$6,000 plus additional funding depending on endowment earnings), the Alvin G. Flanigan Scholarship Fund (annual \$1,000 minimum awards), the Walker Family Scholarship Fund (annual \$500 minimum awards), the Michael Lee Hoelscher Memorial Scholarship (annual \$2,000 award), the Jamie Hallum Memorial Scholarship (annual \$2,000 award), and additional scholarships available only to the Presidents Leadership Class Scholars.

### Faculty

ANGELA THIEMAN-DINO, academic director. BA, MA, PhD, University of Colorado at Boulder.

### Reserve Officer Training Corps

Enrollment in Reserve Officer Training Corps (ROTC) programs is open to both men and women, and ROTC lower-level leadership courses are open to all students whether or not they contract with ROTC.

All services provide undergraduate and selected graduate students with the opportunity to combine academic study with a military officer's educational program. The three services conduct courses in their respective areas leading to a regular or reserve commission upon graduation. The Navy also offers a program leading to a regular commission in the Marine Corps.

### Air Force Aerospace Studies

U.S. Air Force ROTC offers several programs leading to a commission in the U.S. Air Force upon receipt of at least a baccalaureate degree.

#### *Standard Four-Year Program*

This standard program is designed for incoming freshmen, or any student with four years remaining until degree completion. It consists of three parts: the general military course (GMC) for lower-division (normally freshman and sophomore) students; the professional officer course (POC) for upper-division students

(normally juniors and seniors); and the leadership laboratory (LLAB) attended by all cadets. Completion of a four-week summer field training program is required prior to commissioning.

#### *Modified Four-Year Program*

Certain undergraduate and graduate students may be eligible for this program. It is offered to full-time, regularly enrolled degree students and requires at least five semesters of full-time college work (undergraduate or graduate level, or a combination). May only be available to students pursuing academic majors in demand. Those selected for this program must complete the field training program during the summer months as a prerequisite for entry into the professional officer course the following fall semester.

#### *Leadership Lab*

All AFROTC cadets must attend leadership lab (two hours per week). The laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, career opportunities, and the life and work of an Air Force junior officer.

#### *Other Air Force ROTC Programs*

Other programs are frequently available based on current Air Force needs. Any AFROTC staff member in Boulder (303-492-8351) can discuss the best alternatives. Interested students should make initial contact as early as possible to create the best selection opportunity, as selection is on a competitive basis. There is no obligation until a formal contract is entered.

#### *Air Force College Scholarship Program*

Normally a scholarship board is held at the end of each semester for students who have at least one semester of full-time college credit. Prior participation in AFROTC may not be required to compete for these scholarships. Students can compete for scholarships in most academic majors. Students selected for this program receive scholarships that pay up to \$18,000 in tuition, a book allowance, nonrefundable educational fees, and subsistence each month, tax-free. These scholarships are available in all academic disciplines and are two to three years in length.

#### *USAF Medical Programs*

Qualified nursing students can compete for nursing scholarships. These scholarships can lead to a career as an Air Force officer, serving as a nurse. Students may also compete for a pre-health designator. If selected, they would receive a scholarship for medical school.

#### *Air Force ROTC Course Credit*

AFROTC credit for graduation varies with each college. Students should contact the appropriate college for credit determination.

#### *Registration*

CU-Boulder students who wish to register for AFROTC classes sign up for them through the normal course registration process.

#### *Military Science (U.S. Army)*

The Department of Military Science offers programs leading to an officer's commission in the active Army, Army Reserve, or National Guard in conjunction with an undergraduate or graduate degree. Military science courses are designed to supplement a regular degree program by offering practical leadership and management experience.

### Four-Year Program

The four-year program consists of two phases: the basic course (freshman and sophomore years) and the advanced course (junior and senior years).

Basic offers a 2- or 3-credit course each semester, covering Army history and organization as well as military leadership and management. Laboratory sessions provide the opportunity to apply leadership skills while learning basic military skills. Enrollment in the basic course incurs no military obligation except for Army scholarship recipients.

Advanced covers leadership, tactics and unit operations, training techniques, military law, and professional ethics, and includes a leadership practicum each semester. A 35-day summer advanced camp at Fort Lewis, Washington, provides challenging leadership training, and is a prerequisite for commissioning. The advanced course students must have completed the basic course and obtain permission from the professor of military science (PMS).

### Two-Year Program

The two-year program consists of the advanced course, preceded by a four-week summer ROTC basic course at Ft. Knox, Kentucky. Veterans or students who have participated in three years of Junior ROTC or Civil Air Patrol may be eligible to enroll in the advanced course without attendance at basic camp or completion of the basic course. Inquiries on advanced placement should be directed to the Department of Military Science. The advanced course students must obtain permission from the professor of military science (PMS).

### Scholarship Programs

Four-year college scholarships are available to high school seniors, who should apply before January 10 of their senior year. Competition for two- and three-year scholarships is open to all University of Colorado students, regardless of academic major and whether or not they are currently enrolled in ROTC. Scholarship students receive tuition and laboratory fees, a book allowance, and an allowance of \$300–\$500 per month during the academic year. Students interested in the scholarship program should contact the enrollment officer no later than the beginning of the spring semester to apply for the following academic year. Contact the enrollment officer at **303-492-3549** or **303-492-6495**.

### Simultaneous Membership Program

Students entering the second year of ROTC (basic) or the advanced course may participate with an Army Reserve or Army National Guard unit as an officer trainee. Students participating in this program earn approximately \$240 in monthly drill pay in addition to the \$350–\$500 monthly stipend. Additionally, SMP participants are eligible for Army National Guard or reserve education benefits that provide up to \$4,500 per year tuition assistance.

### Army ROTC Course Credit

ROTC serves as elective credit in most departments. Elective course credit toward the student's degree for AROTC classes will be determined by the individual academic advisor.

### Registration

Students who wish to register for Army ROTC classes sign up for them through the normal course registration process. AROTC classes begin with the MILR prefix. For more information, contact the enrollment and scholarship officer at CU-Boulder at **303-492-3459** or **303-492-6495**. See also the AROTC website at [www.colorado.edu/arotc](http://www.colorado.edu/arotc).

### Naval Science

Naval science course work is offered in the fall and spring semesters only. All naval science students enroll in NAVR 1010, 2020, 4010, and 4020. Those desiring commissions in the U.S. Navy enroll in NAVR 3020, 3030, 3040, and 4030 for upper-division work. Those desiring commissions in the U.S. Marine Corps enroll in NAVR 3101 and 4101 for upper-division work.

### Scholarship Programs

NROTC offers two-, three-, and four-year scholarship programs, and two-year and four-year college (non-scholarship) programs. Navy scholarships may be earned while students are enrolled in the college program. Scholarship students receive tuition and fees, a \$375 book allowance per semester, and a \$250 per month subsistence allowance. This subsistence allowance gradually rises to \$400 by the student's senior year. College program students receive a \$350 per month subsistence allowance their junior year and \$400 per month subsistence allowance their senior year in the program.

Naval science (Navy option) students must complete one year of calculus, physics, and English, and one semester of American military history or national security policy, and a cultural course. Students should check with their naval science instructor to determine specific course offerings that fulfill the above requirements.

### Degree Credits

The number of NROTC semester hours of credit that may count toward degree requirements is determined by the individual colleges. Students should therefore consider their college's policy when formulating their degree plan.

### Commissioned Service

Opportunities for commissioned service are presently available in the unrestricted line (surface, subsurface, aviation, special warfare, and special operations) and staff corps (nursing) in the U.S. Navy. Opportunities in ground and aviation specialties are available in the U.S. Marine Corps. Students interested in other programs leading to commissions in either the U.S. Navy or U.S. Marine Corps are encouraged to contact the NROTC unit on campus. All commissioning programs require that the student be working toward, and receive, a college degree.

### Faculty

#### Aerospace Studies Faculty

KEITH E. TOBIN, colonel, U.S. Air Force; chair; professor. BS, Rutgers State University of New Jersey; MS, SAAS.

KIMBERLY E. FOX, major, U.S. Air Force; assistant professor. BA, Wright State University; MBA, Embry-Riddle Aeronautical University.

LAILA S. SAED, captain, U.S. Air Force; assistant professor. BS, University of Colorado; MBA, University of Utah.

JASON A. SCHLARB, captain, U.S. Air Force; assistant professor. BS, Montana State University; MBA, University of Phoenix.

#### Military Science (U.S. Army)

JOHN R. TOTH, lieutenant colonel, U.S. Army; chair; professor. BA, University of Pennsylvania; MMAS, Command and General Staff College and School for Advanced Military Studies, Ft. Leavenworth.

JOSHUA DALTON, captain, U.S. Army Active Guard Reserve; instructor. BA, University of South Dakota; MA, American Military University.

LUISA A. DURAN, commandant of cadets, U.S. Army; assistant professor.

JIM HODGE, lieutenant colonel (r); assistant professor. BA, Columbus College; MA, Webster University.

DAVID HOLBROOK, captain, U.S. Army; assistant professor. BA, Kentucky Christian College; MA, Abilene Christian University.

CARA MCLEAN, captain, U.S. Army National Guard; assistant professor. BA, University of Colorado at Boulder; MA, University of Denver.

### Naval Science

SHEILA M. Q. SCANLON, colonel, U.S. Marine Corps; chair; professor. BA, Notre Dame; MA, National War College.

LESLIE E. HIRKO, commander, U.S. Navy; associate professor. BS, United States Naval Academy; MSS, Marine Corps War College.

WARREN KEIERLEBER, lieutenant, U.S. Navy; assistant professor. BA, University of Texas.

NICHOLAS D. LEVINE, lieutenant, U.S. Navy; assistant professor. BS, University of Denver; MEM, Old Dominion University.

RICARDO N. LEYVA, lieutenant, U.S. Navy; assistant professor. BS, United States Naval Academy.

JUAN M. NAVARRO, major, U.S. Marine Corps; assistant professor. BA, University of Idaho; MA, Webster University.

NICHOLAS J. SCHONS, lieutenant, U.S. Navy; assistant professor. BS, Iowa State.

## Technology, Arts, and Media Program

The ever-expanding landscape of the networked age requires new and adaptable skill-sets, within both academic and commercial paradigms. In order to address this need, the Technology, Arts, and Media Program, based within the ATLAS Institute, offers two undergraduate programs: a Minor in Technology, Arts, and Media (MTAM) and a smaller Certificate in Digital Media (CDM). The minor is intended for students who wish to pursue research and career related to digital media, whereas the certificate is intended for students who are interested in the fundamentals of digital media production.

### Certificate in Digital Media (CDM)

The Certificate in Digital Media (CDM) provides a fundamental understanding of information technology and digital media production. The program will motivate students to think critically about technology and its impacts upon society.

#### Certificate Goals

- to equip students with a basic digital media skill-set
- to transform students from passive users of technology into active producers of technology

#### Certificate Requirements

A minimum of 9 credit hours:

- ATLS 2000, The Meaning of Information Technology
- ATLS 3010, Digital Media 1
- Invention and Practice Elective\*

Student must maintain a 2.000 GPA within all CDM courses.

Students must earn a minimum grade of *C* in all courses counted for the certificate.

Course work used to satisfy CDM requirements cannot be taken *pass/fail*.

Core ATLS courses cannot be substituted (ATLS2000, ATLS3010).

\*See [tam.colorado.edu](http://tam.colorado.edu) for a current listing of approved elective courses.

### Minor in Technology, Arts, and Media (MTAM)

The minor in Technology, Arts, and Media (MTAM) provides a broad multidisciplinary perspective that integrates technological skills with a critical, theoretical, and historical understanding of technology, media, and the arts. The MTAM curriculum includes

creative production courses, as well as classes that impart foundational knowledge and critical perspectives on the role of technology in society. Students from a wide range of majors receive instruction in digital media production, design, art criticism, computer programming, information technology, data visualization, media and societal analysis, and project development.

#### Minor Goals

- to prepare the next generation of artists, designers, and media producers for the networked age
- to give students the necessary technical, theoretical, and historical backgrounds so they can contribute to the development of new functionalities and aesthetics for computer media
- to facilitate the exploration of the intersection of technology and other specific disciplines
- to produce active and critically aware participants and producers of technology

#### Minor Requirements

A minimum of 21 credit hours:

- ATLS 2000, The Meaning of Information Technology
- ATLS 3010, Digital Media 1
- ATLS 3020, Digital Media 2
- Historical and Social Implications Elective\*
- Theories and Foundations Elective\*
- Invention and Practice Elective\*
- ATLS4010, Capstone

Students must maintain a 2.000 GPA within all MTAM courses.

Students must earn a minimum grade of *C* in all courses counted for the minor.

Students may not take more than one elective course from a single department (this does not apply to ATLS courses).

Course work used to satisfy MTAM requirements cannot be taken *pass/fail*.

ATLS core courses cannot be substituted (ATLS 2000, ATLS 3010, ATLS 3020, ATLS 4010).

A minimum of 15 credit hours must be taken on the Boulder campus.

Failing to meet the minimum grade for any individual ATLS core course twice will result in automatic removal from the MTAM program.

\*See [tam.colorado.edu](http://tam.colorado.edu) for a current listing of approved elective courses.

#### Course Substitutions

- Course work not on the approved elective list (including course work from another University of Colorado campus, another institution, Study Abroad, or Semester at Sea) must be approved by the MTAM Faculty committee. Students must complete a Course Substitution Petition Request Form and attach supporting documentation (syllabus).
- Substitution requests will not be considered if the student has already satisfied the requirement with an approved elective course.

### TAM Faculty

JOHN BENNETT, ATLAS director; professor, Department of Computer Science, Department of Electrical and Computer Engineering, Interdisciplinary Telecommunications Program. BS, MS, Rice University; PhD, University of Washington.

JILL VAN MATRE, ATLAS associate director. BS, Indiana University; JD, University of Colorado at Boulder.

IAN HALES, instructor. BA, University of Colorado at Boulder.

AILEEN PIERCE, instructor. BS, Carnegie-Mellon University.

DAVID SCHAAL, instructor. BA, BFA, MFA, University of Colorado at Boulder.

JOEL SWANSON, TAM director; instructor. BFA, University of Colorado; MFA, University of California, San Diego.

**College of Architecture and Planning 318**

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**College of Arts and Sciences 320**

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**Leeds School of Business 468**

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**School of Education 480**

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**College of Engineering and Applied Science 487**

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**School of Journalism and Mass Communication 520**

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**Law School 523**

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**College of Music 532**

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**Other Academic Programs 540**

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## Course Descriptions

The following courses are offered on the Boulder campus during the 2010–11 academic year. This listing does not constitute a guarantee that any particular course will be offered during this year. Consult specific programs and major requirements within each school and college for more information. Also see the online Schedule Planner for details about course offerings. Changes in course descriptions may have occurred since catalog publication; see the online catalog for course description updates at [www.colorado.edu/catalog](http://www.colorado.edu/catalog).

## Course Numbering

Always consult specific departments and programs within schools and colleges for restrictions, requirements, and prerequisites.

- **1000–2000 courses** are usually intended for lower-division students (freshmen and sophomores).
- **3000–4000 courses** are intended for upper-division students (juniors and seniors), and may require instructor's consent. Consult the program or department for other restrictions.
- **5000-level courses** usually require graduate-student status, but may be open to qualified undergraduates with instructor consent. Consult the program or department.
- **Courses at the 6000, 7000, and 8000 level** are usually open only to graduate students. Consult the program or department for restrictions.

## Finding a Course by Course Number

Some departments list their courses in numerical order. For others, courses are sorted by 1) the first digit and then 2) the fourth digit. For example, all ENVD 2xx0 course are listed together, then all ENVD 2xx2 courses, then all ENVD 2xx3, etc.

## Abbreviations

Coreq.—corequisite

Lab.—laboratory

Lect.—lecture

Prereq.—prerequisite

Rec.—recitation

# College of Architecture and Planning

## Architecture

**ARCH 3114-3. History and Theories of Architecture 1.** Surveys architecture, landscape architecture, and urban design from 3000 B.C. to A.D. 1400, emphasizing developments in the Western world. Open to nonmajors on a space available basis.

**ARCH 3214-3. History and Theories of Architecture 2.** Surveys architecture, landscape architecture, and urban design from A.D. 1400 to the present, emphasizing developments in the Western world. Open to nonmajors on a space available basis.

**ARCH 4010-3. Architectural Appreciation and Design.** Introduces basic processes and principles of architectural design. Provides a basis for understanding and evaluating architecture. Open to AREN seniors and second semester juniors only.

## Environmental Design

### Studios

**ENVD 2100-6. Architecture Studio 1.** The first of four architecture studios, this class introduces students to the basic strategies and techniques of architectural design. Focuses on the languages of design, as well as on traditional and digital methods of visualizing architectural ideas and forms. Prereq., ENVD 2002.

**ENVD 2120-6. Environmental Design Lab:Sustainable Design.** Exposes students to a sequence of design investigations that lead to the development of design concepts for critical evaluation and discussion. The intent of this introductory design studio is to expose students to the fundamental design practices that are common to the disciplines of environmental design, planning, urban design, and landscape design—that share the responsibility for shaping the designed environment. Prereqs., ENVD 1004 and 1104. Coreqs., ENVD 3122 and 3124.

**ENVD 2130-6 Environmental Design Lab: Conservation Design.** Exposes students to a sequence of design investigations that lead to the development of the design concepts for critical evaluation and discussion. The intent of this introductory design studio is to expose students to the fundamental design practices that are common to the disciplines of architecture, urban design, and landscape design—disciplines that share the responsibility for shaping the designed environment. Prereqs., ENVD1004 and 1104. Coreqs., ARCH 3114 and ENVD 3115.

**ENVD 3220-6. Planning Studio 2.** See ENVD 2120. Prereq., ENVD 2120. Restricted to PLAN majors.

**ENVD 3300 (3-6). Special Topics: Intermediate Design Lab.** Design lab exploring new and emerging themes in environmental design. May be repeated up to 12 total credit hours. Prereq., ENVD 2120, 2130. Coreqs., ENVD 3001 and 3131.

**ENVD 3310-6. Architecture Studio 2.** The second of the four upper-division studios focuses on concepts of medium-scale building design, siting, and climate. Through a number of design exercises, students learn how these factors help shape buildings. Prereq., ENVD 3110. Formerly ENVD 3210.

**ENVD 3320-2. Planning Practicum.** Supervised practicum in some aspect of urban or regional planning. Prereq., ENVD 3220.

**ENVD 4300 (3-6). Advanced Design Lab.** Design lab exploring new and emerging themes in design. May be repeated up to 12 total credit hours. Prereq., ENVD 3300.

**ENVD 4320-6. Planning Studio 3.** See ENVD 2120. Prereq., ENVD 3220. Restricted to PLAN majors.

**ENVD 4340 (4-6). Landscape Design Studio.** Studio in landscape design. Prereq., ENVD 2100.

**ENVD 4360 (4-6). Historic Preservation Studio.** A design studio exploring emerging issues and practices in historic preservation. Prereq., ENVD 2100.

**ENVD 4420-3. Senior Planning Seminar.** Advanced seminar focuses on theoretical concerns and practical issues inherent in environmental design planning. Views concerns and issues in terms of setting, processes, and planning outcomes. Provides a critical synthesis of the inherently interdisciplinary nature of planning education. Open to planning seniors only, or by instructor consent.

**ENVD 4510-6. Architecture Studio 3.** The third of the four upper-division studios focuses on concepts of program, architectural meaning and human behavior in buildings. Through a number of design exercises, students learn how these factors help shape buildings. Prereq., ENVD 3310. Formerly ENVD 4310.

**ENVD 4550-6. Urban Design Studio.** A studio exploring emerging issues and practices Prereq., ENVD 2100.

**ENVD 4710-6. Architecture Studio 4.** The last of the four upper-division studios focuses on concepts of building technology, context and environmental sustainability. Prereq., ENVD 4510. Formerly ENVD 4410.

## Social Factors

**ENVD 2001-3. Social Factors and Design.** Critically evaluates designed environments. Considers how social and individual behavior is reflected in and influenced by the designed environment.

**ENVD 3001-3. Environment and Behavior.** Examines the social and behavioral aspects of relationships between people and the designed environment. Gives special attention to antecedent factors (why we have the environments we do), implications of given arrangements for special population groups, and responses to incongruent environments.

**ENVD 3131-3. Citizen Participation in Design and Planning.** See the Division of Environmental Design for details. Prereqs., ENVD 2120 and 2130.

**ENVD 4311-3. Housing Policies and Practices.** A seminar providing students with a descriptive knowledge and analytical understanding of the use and development of residential settings in different political economies, globally divided into advanced capitalist nations, collectivist economies, and the third world. Prereqs., ENVD 2001, 3001. Open to PLAN majors only, except by instructor consent.

**ENVD 4361 (1-6). Special Topics: Social Factors in Design.** Addresses variable topics in the relationship of human experience and behavior to the built environment, e.g., social research methods in environmental design. May be repeated for credit by petition.

## Methods and Techniques

**ENVD 1052-3. Design and Communication: Digital.** Using both lectures and drawing exercises, this class extends understandings of the representational conventions used by the design professions through its introduction to the possibilities offered by emerging digital techniques for the depiction of designed artifacts and environments, allowing students to extend and enhance their understandings of advanced practices for design visualization, representation, and communication.

**ENVD 1102-3. Design and Communication: Analog.** Using both lectures and drawing exercises, this class extends understanding of the representational conventions used by the design professions through its introduction to the possibilities offered by traditional techniques for the depiction of designed artifacts and environments. This allows students to extend and enhance their understanding of advanced practices for design visualization, representation, and communication.

**ENVD 2052-3. Introduction to Computers in Planning.** Introduces the use of computers in design fields, including applications for word-processing, desktop publishing, graphic creation, and CAD-style design. Aims to provide basic general skills in computer use that are transferable to other computer applications.

**ENVD 2152-3. GIS for Planners.** Focuses on construction and use of computer-based information systems to represent and manipulate geographic data. Emphasizes the recording, mapping, and transforming of data for analysis and use by planners.

**ENVD 3022-3. Technical Photography.** Introduces students to the technical and practical aspects of making photographic images: the workings of the camera and lens, principles of depth of field, black and white film process-



ing, printing, and basic darkroom procedures. Open to nonmajors on a space available basis.

**ENVD 3052-3. Introduction to Computer Methods in Environmental Design.** Surveys existing and emerging computer methods used in the environmental design professions, with an introduction to computer programming. Prereq., MATH 1300 and PHYS 2010, or instructor consent. Open to nonmajors.

**ENVD 3122-3. Research Issues and Methods in Design Planning.** Explores topics of current interest in planning. Looks at the development and social consequences of the neighborhood movement, forms of municipal and regional governments, regional settlement patterns, and new communities. Introduces selected methods from the social sciences used by planners and urban designers. Prereqs., ENVD 1004 and 1104.

**ENVD 3152-3. Introduction to Computer Graphics Applications.** Explores principles and uses of computer graphics in design. Topics include creation and modification of complex two- and three-dimensional objects; orthographic and perspective views; use of color; input using mouse and digitizer; output using screen, plotter, matrix printer, and slides; automated aids for form generation and manipulation; and analysis of current and future trends of computer usage for design. Prereq., ENVD 3352.

**ENVD 3212-3. Color Theory.** Illustrates color media techniques for the preparation, composition, and presentation of landscape and built environment drawings. Prereqs., ENVD 2002; 2110 or 2120

**ENVD 3252-3. Computer Graphic Programming.** Provides an introductory computer programming course designed to teach the capabilities of a computer in providing graphic representations of environments, including buildings. Open to nonmajors.

**ENVD 3352-3. Architectural Computer Media.** Introduces the integration of computing and the architectural design process and related representational tasks. Studies common computer-aided design programs, emphasizing two- and three-dimensional and animation techniques.

**ENVD 4052-3. Digital Presentation and Portfolio.** Introductory course creating interactive web sites. Covers use of Hypertext Markup Language (HTML) and Flash to create linked pages containing text, images animations, menus, and buttons. Covers principles of site navigation, page layout, and graphic design for designers and planners. Granted not granted for this course and ENVD 2352.

**ENVD 4112-3. Architectural Graphics 1.** Illustrates techniques of graphics communication and presentation for architectural design. Includes advanced delineation and use of color. Prereqs., ENVD 2002 and 2110 or 2120.

**ENVD 4122-3. Advanced Technical Photography.** Focuses on working with a variety of alternative photographic processes intended to give students an array of photographic techniques to incorporate into studio course presentations and portfolio work. Processes include hand-applied color to black and white images, using two or more negatives to produce black and white combination prints, shooting color slides to produce graphic arts, high-contrast black and white prints, and documentary photography of Colorado architecture and urban landscapes using color slide film. Students must provide their own 35mm SLR camera. Prereq., ENVD 3022 or ARTS 2191 or instructor consent.

**ENVD 4152-3. Computer Graphic Applications.** Introduces the mechanics of entering 2-D images and 3-D objects into the computer. Once entered, graphics are interactively rotated in space, walked through, and displayed in perspective from any position. Also covers the mechanics of other computer programs allowing additional manipulation of images and objects.

**ENVD 4212-3. Architectural Graphics 2.** Covers development of an architectural set of construction documents combined with job administration, field observation, and guest speakers from related construction and architectural disciplines. Prereqs., ENVD 2002 and 2110 or 2120.

**ENVD 4322 (1-6). Special Topics: Graphics.** Provides an advanced seminar on special issues in design communications. May be repeated for credit by petition. Prereq., upper-division standing. Open to nonmajors on a space available basis or by instructor consent.

**ENVD 4352 (1-6). Special Topics: Computer Methods.** Topics include animation and environmental simulation, computational methods of technical evaluation

and optimization, and computational mapping and analysis. May be repeated for credit by petition. Open to nonmajors on a space available basis.

## Physical Factors

**ENVD 2003-3. Ecology and Design.** Introduces basic principles and techniques of ecology as they relate to the design and understanding of the built environment. Includes a study of hazards and the impact of modern technology on the natural and built environments. Open to nonmajors on a space available basis.

**ENVD 4023-3. Environmental Impact Assessment.** Provides a field-oriented seminar in current environmental impact controversies. Gives attention to history, theory, and application of impact analysis at state levels for designers, land-use planners, and others involved in resource decision making. Prereq., instructor consent. Open to nonmajors on a space available basis, by instructor consent.

**ENVD 4233-3. Environmental Aesthetics.** Explores the interdisciplinary field of environmental aesthetics, examining the history of landscape tastes, theoretical approaches to the study of aesthetic responses, and contemporary attempts to incorporate matters of aesthetics in American planning. Emphasizes developing analytical and critical approaches to aesthetics in the public realm.

**ENVD 4363 (1-6). Special Topics: Physical Factors in Environmental Design.** Includes such topics as appropriate technology, public policy and natural hazards, organization of the designing and building process, and physical elements of urban development. May be repeated for credit by petition. Prereq., upper-division standing.

## History and Theory

**ENVD 1004-3. Introduction to Environmental Design Theory.** Introduces students to the complexity of forces that interact to shape the designed environment. A lecture sequence and parallel set of design exercises exposes students to the theory and practice of environmental design, and to the important issues that guide the work of architects, landscape architects, urban designers, and urban planners. Coreqs., ENVD 1052 and 2001.

**ENVD 1104-3. Introduction to Environmental Design Methods.** Explores the forces and conditions that interact to shape the designed environment. It does so through a lecture sequence and parallel set of design exercises introducing students to the theory and practice of environmental design. It develops student understandings of the central role design thinking plays as the unique process used to effect appropriate change in the designed environment. Coreqs., ENVD 1024 and 2003.

**ENVD 3124-3. Issues in Planning History.** Broadly introduces physical environmental planning in the U.S., examining both historical roots and recent trends in American planning concepts and implementation. Emphasizes an analytical and critical approach to historical and contemporary planning issues, mechanisms, and cases. Prereqs., ENVD 1004 and 1104.

**ENVD 4114-3. History of American Architecture and Urbanism.** Surveys architecture, landscape architecture, urban design, and planning in the U.S. from ca. 1600 to the present. Prereq., ARCH 3214 or equivalent, or instructor consent.

**ENVD 4314-3. Architectural Theory.** Surveys, through lectures and readings, the major historical developments and contemporary directions in architectural theory. Prereqs., ARCH 3114 and ARCH 3214.

**ENVD 4364 (1-6). Special Topics: History and Historiography of Environmental Design.** Provides an advanced seminar on history and historiography of environmental design, e.g., American dwellings. May be repeated for credit by petition. Prereq., ARCH 3214, equivalent, or instructor consent. Restricted to juniors and seniors.

**ENVD 4764 (1-6). Special Topics: Theory and Criticism in Environmental Design.** Provides an advanced seminar on theory and criticism in environmental design, e.g., architecture now and introduction to design theory and criticism. May be repeated for credit by petition. Prereq., ARCH 3214, equivalent, or instructor consent.

**ENVD 4794-3. History of Urban Design and Planning.** Examines history of European and American planning and urban design in the late 19th and 20th centuries.

### Technology and Practice

**ENVD 3015-3. Introduction to Historic Preservation.** Introduces methods for identifying historic structures and evaluating their materials. Considers techniques for preserving and restoring and legal options for promoting preservation efforts.

**ENVD 3115-3. Introduction to Building Materials and Systems.** Surveys building methods, materials, and assemblies from the designer's perspective.

**ENVD 4035-3. Solar and Sustainable Design.** Introduces aspects of solar technology relevant to the environmental design professions. Includes readings and lectures on the nature of energy limitations, energy needs, and the potential role of solar energy in meeting these needs. Prereq., PHYS 2010 or equivalent.

**ENVD 4365 (1-6). Special Topics: Technology and Practice.** Provides an advanced seminar on new technologies and issues of professional practice in the environmental design professions. May be repeated for credit by petition. Restricted to juniors and seniors.

### Miscellaneous

**ENVD 3909 (1-6). Independent Study.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA.

**ENVD 3919 (1-6). Teaching Assistant.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA. Available for pass/fail credit only.

**ENVD 4909 (1-6). Independent Study.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA.

**ENVD 4919 (1-6). Teaching Assistant.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA. Available for pass/fail credit only.

**ENVD 4929 (1-6). Research Assistant.** By special arrangement with instructor. Prereq., junior standing and 3.00 GPA.

**ENVD 4939 (1-6). Internship.** By special arrangement with instructor and outside sponsor. Prereq., junior standing and 3.00 GPA. Available for pass/fail credit only.

## College of Arts and Sciences

### American Studies

*See Ethnic Studies.*

### Anthropology

**ANTH 1030-3. Principles of Anthropology 1.** Evolution of humanity and culture from beginnings through early metal ages. Covers human evolution, race, pre-history, and rise of early civilizations. This course is taught through Continuing Education. Meets MAPS requirements for social science: general.

**ANTH 1040-3. Principles of Anthropology 2.** Surveys the world's major culture areas. Covers components of culture, such as subsistence, social organization, religion, and language. This course is taught through Continuing Education. Meets MAPS requirement for social science: general.

**ANTH 1100-3. Exploring a Non-Western Culture: The Tamils.** Surveys the social and economic patterns, ideas and values, and aesthetic achievements of the Tamils, a Hindu people who live in South India and Sri Lanka. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1105-3. Exploring a Non-Western Culture: Tibet.** Introduction to Tibetan culture, history, religion, and society from an anthropological perspective, including traditional as well as contemporary dimensions. Topics will include Tibetan Buddhism, politics, nomadism, gender, refugee issues, and the global Tibetan diaspora, all framed within the larger methods and concepts of cultural anthropology. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1110-3. Exploring a Non-Western Culture: Japan.** Examines modern Japan in terms of cultural styles, social patterns, work practices, aesthetic traditions, ecological conditions, and historical events that shape it as both a non-Western culture and a modern industrial state. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1115-3. The Caribbean in Post-Colonial Perspective.** Introduces the student to the varied peoples and cultures in the Caribbean region, emphasizing the historical, colonial, and contemporary political-economic contexts of their social structure and cultural patterns. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1120-3. Exploring a Non-Western Culture: Hopi and Navajo.** Explores two American Indian cultures, Hopi and Navajo, and cultural interrelationships from the prehistory through the contemporary period, using an integrated, holistic, and humanistic viewpoint. Same as ETHN 1123. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1140-3. Exploring a Non-Western Culture: The Maya.** Explores the culture of the Maya of Central America, emphasizing their material adaptations, social organizations, ideals and values, and artistic achievements in the past and the present. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1145-3. Exploring a Non-Western Culture: The Aztecs.** Explores the culture of the Aztec people of Central Mexico: their subsistence, society, religion, and achievements, as well as the impact of the Aztec empire in Mesoamerica. Also reviews the clash of a non-western society with the western world with the arrival of the Spanish conquistadors.

**ANTH 1150-3. Exploring a Non-Western Culture: Regional Cultures of Africa.** Explores a small number of cultures in a specific sub-region of Africa from an integrated holistic viewpoint, emphasizing material adaptations, social patterns, ideas and values, and aesthetic achievements. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1160-3. The Ancient Egyptian Civilization.** Emphasizes the origin of the Egyptian culture, its importance, and its impact on other cultures. In addition, the different points of view of various scholars are discussed with a comparative study of the ancient Egyptian culture and modern culture of Egypt and the Middle East. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1170-3. Exploring Culture and Gender through Film.** Uses films and written texts to explore the concepts of culture and gender, as well as ethnicity and race. By looking at gender, ethnicity, and race cross-culturally, students will know how these concepts are constructed in their own society, as well as in others. Approved for arts and sciences core curriculum: human diversity.

**ANTH 1180-3. Maritime People: Fishers and Seafarers.** Explores important milestones in the development of human societies and cultures that live from the sea. Emphasizes the evolution of maritime adaptations associated with fishing and seafaring from more than 10,000 years ago through the present. Approved for arts and sciences core curriculum: historical context.

**ANTH 1190-3. Origins of Ancient Civilizations.** Examines origins of the world's first civilizations in Mesopotamia, Egypt, the Indus Valley, MesoAmerica, and the Andes. Covers archaeology of ancient cities, trade, economy, politics, warfare, religion, and ideology. Seeks insights into general processes of cultural evolution. Approved for arts and sciences core curriculum: historical context.

**ANTH 1200-3. Culture and Power.** Compares contemporary sociopolitical systems across cultures, from non-Western tribal groups to modern states. Introduces students to anthropological approaches for understanding and analyzing political forces, processes, and institutions that affect cultures such as colonialism, warfare, violence, ethnicity, migration, and globalization. Approved for arts and sciences core curriculum: contemporary societies.

**ANTH 2009-3. Modern Issues, Ancient Times.** Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved, and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life. Same as CLAS 2009. Approved for arts and sciences core curriculum: historical context.

**ANTH 2010-3. Introduction to Physical Anthropology 1.** Detailed consideration of human biology, the place of humans in the animal kingdom, primate ecology, and fossil evidence for human evolution. Credit not granted for this course and ANTH 2050. Required for ANTH majors. Meets MAPS requirement for natural science: non-lab. Approved for arts and sciences core curriculum: natural science.

**ANTH 2020-3. Introduction to Physical Anthropology 2.** Continuation of ANTH 2010. Emphasizes genetics, human variation, and microevolution. Prereq., ANTH 2010. Credit not granted for this course and ANTH 2060. Approved for arts and sciences core curriculum: natural science.

**ANTH 2030-1. Laboratory in Physical Anthropology 1.** Lab in human osteology and musculoskeletal system emphasizing comparative primate morphology, adaptation, and the fossil record documenting the natural history of primates. Coreq., ANTH 2010. Meets MAPS requirement for natural science: lab, when taken with ANTH 2010. Approved for arts and sciences core curriculum: natural science.

**ANTH 2040-1. Laboratory in Physical Anthropology 2.** Experiments and hands-on exercises designed to enhance understanding of the principles and concepts presented in ANTH 2020. One two-hour class per week. Coreq., ANTH 2020. Approved for arts and sciences core curriculum: natural science.

**ANTH 2050-4. Honors: Human Origins 1.** Explores how the following two major bodies of evidence for human evolution are used by physical anthropologists in search of human origins: humankind's close physical and behavioral similarity to other living species, particularly living primates; and the fossil record for human evolution. Credit not granted for this course and ANTH 2010. Approved for arts and sciences core curriculum: natural science.

**ANTH 2060-4. Honors: Human Origins 2.** Surveys evidence for the continuing evolution of *Homo sapiens*. Emphasizes how physical anthropologists use data and concepts from medicine, genetics, demography, and ecology to understand the evolution of human biological diversity and adaptation. Credit not granted for this course and ANTH 2020. Approved for arts and sciences core curriculum: natural science.

**ANTH 2070-3. Bones, Bodies, and Disease.** Studies the human skeleton and introduces techniques used to evaluate demographic variables. Applies tech-

niques through evaluation of photographic images of an excellently preserved mummified skeletal population from ancient Nubia to reconstruct prehistoric patterns of adaptation and biocultural evolution. Offered through Continuing Education only. Recommended prereq., ANTH 2010.

**ANTH 2100-3. Frontiers of Cultural Anthropology.** Covers current theories in cultural anthropology and discusses the nature of field work. Explores major schools of thought and ethnographic fieldwork in a range of cultures studied by anthropologists. Required for ANTH majors.

**ANTH 2200-3. Introduction to Archaeology.** Discusses history, basic concepts, techniques, and theoretical construction of archaeological field and laboratory investigations, as well as a general outline of world prehistory. Required for ANTH majors.

**ANTH 2210-1. Laboratory Course in Archaeological Methods.** Studies analytical methods in archaeological research including those employed both in the field and in the laboratory. Deals with practical exercises illustrating many of the theoretical principles covered in ANTH 2200. Coreq., ANTH 2200.

**ANTH 3000-3. Primate Behavior.** Surveys naturalistic primate behavior. Emphasizes social behavior, behavioral ecology, and evolution as they lead to an understanding of human behavior. Prereqs., ANTH 2010 or EBIO 1220 and junior standing. Approved for arts and sciences core curriculum: natural science.

**ANTH 3010-3. The Human Animal.** Identifies genetic, anatomical, physiological, social, and behavioral characteristics humans share with other mammals and primates. Explores how these characteristics are influenced by modern culture. Prereq., ANTH 2010 or equivalent. Approved for arts and sciences core curriculum: natural science.

**ANTH 3100-3. Africa: Peoples and Societies in Change.** Examines culture and politics in Africa through works by anthropologists and historians, as well as novels, films, and journalistic accounts. Special attention is devoted to the ways in which various African cultures have creatively and resiliently responded to the slave trade, European colonialism, and post-colonialism.

**ANTH 3110-3. Ethnography of Mexico and Central America.** A broad overview, focusing on Mexico and Guatemala. Major topics include ethnohistory, indigenous and mestizo peoples, and contemporary problems and issues.

**ANTH 3130-3. North American Indians: Traditional Cultures.** Comprehensive survey of native cultures of America north of Mexico, including a review of their natural environments, prehistory, languages, and major institutions for various culture areas. Restricted to sophomores/juniors/seniors. Same as ETHN 3133.

**ANTH 3160-3. Peoples of the South Pacific.** Surveys traditional island cultures and contemporary changes in the Pacific, focusing on how the Pacific Islands were first settled, some of the great anthropologists who studied the islanders, and how current environmental changes, such as global warming, threaten the future existence of the islands. Restricted to juniors/seniors.

**ANTH 3170-3. America: An Anthropological Perspective.** Historical and contemporary aspects of American life are considered from an anthropological perspective. Approved for arts and sciences core curriculum: United States context.

**ANTH 3180-3. Gender, Culture, and Sexuality.** Focuses on gender, that is, the making of men and women, and how gender is culturally constructed in different societies. Gender describes many areas of behavior, feelings, thoughts, and fantasies that cannot be understood as primarily biologically produced. Sexuality and sexual systems are sometimes viewed as products of particular gendering practices, but recent theories suggest that sexual systems themselves constitute gender. Prereq., ANTH 2100. Similar to WMST 2080.

**ANTH 3218-3. Peoples and Cultures of West Africa.** Deals with the history and anthropology of selected west African societies in the period before the imposition of European colonial rule. Same as HIST 3218.

**ANTH 3300-3. Elements of Religion.** Explores universal components of religion, as inferred from religions of the world, ranging from smaller-scale oral to larger-scale literate traditions. Restricted to sophomores/juniors/seniors. Same as ETHN 3301.

**ANTH 4000-3. Quantitative Methods in Anthropology.** Surveys ways of deriving meaning from anthropological data by numerical means, including but not confined to basic statistical procedures. Prereqs., ANTH 2010 and 2020. Same as ANTH 5000.

**ANTH 4020-3. Explorations in Anthropology.** Special topics in cultural and physical anthropology, as well as archaeology. Check with the department for semester offerings. May be repeated up to 9 total credit hours. Restricted to junior/senior ANTH majors. Same as ANTH 5020.

**ANTH 4060-3. Nutrition and Anthropology.** Overview of the evolution of human diet and ecological and cultural factors shaping modern diets. Introduces fundamentals of nutrition and analysis of nutritional status. Analyzes ecological, social, and cultural factors leading to hunger and undernutrition, as well as biological and behavioral consequences of undernutrition. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220, or EBIO 1030 and 1040. Same as ANTH 5060.

**ANTH 4070-3. Methods in Biological Anthropology.** Provides laboratory-based research experience in selected areas of biological anthropology. Research designs, methods and applications will be used to develop research skills. Students will read original research papers and carry out a research project of their own design. Area of emphasis within biological anthropology will depend on instructor. May be repeated up to 6 total credit hours. Prereqs., ANTH 2010 and 2020. Recommended prereqs., ANTH 2030, 2040, and 4000. Restricted to juniors/seniors. Same as ANTH 5070.

**ANTH 4110-3. Human Evolutionary Biology.** Detailed consideration of the fossil evidence for human evolution. Covers the discovery of important fossils and interpretations; descriptive information about the fossils; and data and theory from Pleistocene studies relating to ecology, ecological and behavioral data on modern apes, and molecular studies that have bearing on the study of human evolution. Prereqs., ANTH 2010 or 2020 or EBIO 1210 or 1220. Same as ANTH 5110.

**ANTH 4120-3. Advanced Physical Anthropology.** Selected topics in physical anthropology emphasizing faculty specialties. Topics may include population genetics and its application to understanding modern human diversity, human population biology, and primate ecology and evolution. May be repeated up to 6 total credit hours. Prereq., ANTH 2010 or 2020 or EBIO 1210 or 1220. Same as ANTH 5120.

**ANTH 4129-3. Aegean Art and Archaeology.** A detailed study of the cultures of prehistoric Greece, the Cycladic Islands, and Crete, their art and archaeology, and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states. Same as ARTH/CLAS 4129, ANTH 5129.

**ANTH 4130-3. Advanced Osteology.** Detailed study of the human skeleton with special attention to health and demographic conditions in prehistoric cultures and the evaluation of physical characteristics and genetic relationships of prehistoric populations. Prereqs., ANTH 2010, 2020, and 4000. Restricted to juniors and seniors. Same as ANTH 5130.

**ANTH 4150-3. Human Ecology: Biological Aspects.** Discusses role of human populations in local ecosystems, factors affecting population growth, and human adaptability to environmental stress. Detailed consideration of case studies of small-scale societies in different ecosystems. Prereqs., ANTH 2010 and 2020, or EBIO 1210 and 1220. Same as ANTH 5150.

**ANTH 4170-3. Primate Evolutionary Biology.** Focuses on the fossil record of nonhominoid primates. Special emphasis placed on delineating the origins of the order Primates, the origins of the primate suborders Strepsirhini and Haplorhini, and the adaptations of extinct primates in light of our understanding of the modern primate adaptive radiations. Prereqs., ANTH 2010 or EBIO 1210. Same as ANTH 5170.

**ANTH 4180-3. Anthropological Perspectives: Contemporary Issues.** Students read, discuss, and write critical evaluations of contemporary publications in anthropology. Identifies basic themes that inform major anthropological perspectives. Students then bring these perspectives to bear on issues currently facing the human species. May be repeated up to 6 total credit hours. Restricted to seniors.

**ANTH 4210-3. Southwestern Archaeology.** Explores the prehistory of the American Southwest from the earliest entry of humans into the area to the Spanish entrada. Focuses on important themes in cultural development: the adoption of agricultural strategies, sedentism, population aggregation, population movement, and social complexity. Prereq., ANTH 2200. Same as ANTH 5210.

**ANTH 4220-3. From Olmec to Aztec: The Archaeology of Mexico.** Examines the archaeology of Mexico from the initial peopling of the Americas to the Spanish conquest of the Aztec empire. Studies origins of complex societies; ancient Mexican cities, states, and empires; religion and politics; trade and interaction; ecology and economy; and social organization. Prereq., ANTH 2200. Restricted to sophomores, juniors, and seniors. Same as ANTH 5220.

**ANTH 4224-3. Archaeology of the Maya and Their Neighbors.** Begins with the environment and describes the earliest inhabitants and the Olmec civilization, then shifts to the earliest Maya and the emergence and collapse of classic Maya civilization. Compares and contrasts the societies of lower Central America. Prereq., ANTH 2200. Same as ANTH 5224.

**ANTH 4240-3. Geoarchaeology.** Applies geological principles and instruments to help solve archaeological problems. The focus is on site formation processes, soils, stratigraphy, environments, dating, remote sensing, and geophysical exploration. Environmental and ethical considerations are included. Prereq., ANTH 2200. Same as ANTH 5240.

**ANTH 4270-3. Plains Archaeology.** Archaeological evidence for Native American ways of life on the North American Great Plains from the initial peopling of the region into the 19th century. Prereq., ANTH 2200. Same as ANTH 5270.

**ANTH 4330-3. Human Ecology: Archaeological Aspects.** Surveys archaeological approaches to ecology, economy, and landscape: glaciation, geomorphology, and other physical processes creating and affecting sites and regions; environmental reconstruction; theories of human-environment interaction; landscape formation by forager, agricultural, and complex societies; and ideologically structured landscapes. Prereq., ANTH 2200. Restricted to sophomores, juniors and seniors. Same as ANTH 5330.

**ANTH 4340-3. Archaeological Method and Theory.** Surveys archaeological theories and methods within the context of the history of archaeology. Includes archaeological approaches to data recovery, analysis, and interpretation as well as an overview of cultural resources management and ethical issues in contemporary archaeology. Prereq., ANTH 2200. Restricted to juniors and seniors.

**ANTH 4350 (2-6). Archaeological Field and Laboratory Research.** Students participate in archaeological field research or conduct laboratory analysis of archaeological materials and data. Students work with faculty on archaeological research projects with a field or lab focus, depending on the project undertaken. May be repeated up to 6 total credit hours. Prereq., ANTH 2200. Restricted to juniors/seniors. Same as ANTH 5350.

**ANTH 4380-3. Lithic Analysis and Replication.** Uses diversity of approaches to the analysis of ancient stone tools, including fracture mechanics, lithic technology, materials, heat treatment, and functional analysis. Percussion and pressure-flaking experiments are performed. Prereq., ANTH 2200. Same as ANTH 5380.

**ANTH 4390-3. Research Methods in Archaeology I.** Method and theory of archaeology, emphasizing the interpretation of materials and data and the relationship of archaeology to other disciplines. Prereq., ANTH 2200 and instructor consent. Same as ANTH 5390.

**ANTH 4420-3. Archaeology of Ancient Egypt.** Archaeology of ancient Egypt in light of recent excavations; the history of excavations of the different sites; and the art of ancient Egypt through time. Restricted to juniors and seniors. Same as ANTH 5420.

**ANTH 4430-3. Biblical Archaeology.** Old Testament history in the light of archaeological investigation; the Old Testament within the framework of the literature of the ancient near East. Same as ANTH 5430.

**ANTH 4440-3. Egyptian Hieroglyphics 1.** Studies the ancient Egyptian language to shed light on the history and cultures of ancient Egypt. Involves reading and translating hieroglyphics into the English language. Same as ANTH 5440.

**ANTH 4460-3. Archaeology and Contemporary Society.** Explores the intellectual climate in which archaeology is practiced and how it influences archaeological research and reconstruction, laws, regulations, and ethical issues. Explores public use of and engagement with archaeology. Prereq., ANTH 2200 or equivalent. Recommended prereq., one other archaeology course. Same as ANTH 5460.

**ANTH 4500-3. Cross-Cultural Aspects of Socioeconomic Development.** Examines goals of international agencies that support development in underdeveloped countries. Anthropological perspective is provided for such issues as urban planning, health care and delivery, population control, rural development, and land reform. Same as ANTH 5500.

**ANTH 4505-3. Globalization and Transnational Culture.** Covers the historical foundations for contemporary global change, addressing colonialism, global outsourcing, and cultural imperialism, with a particular emphasis on gender, class, and consumerism. Prereq., ANTH 2100.

**ANTH 4510-3. Applied Cultural Anthropology.** Analysis of problems of cultural change due to contacts between people of different cultures. Restricted to senior ANTH or ETHN majors. Same as ETHN 4521 and ANTH 5510.

**ANTH 4520-3. Symbolic Anthropology.** Explores anthropological approaches to the study of symbolic systems, including cosmology, myth, religion, ritual, and art, as well as everyday patterns of metaphor and the presentation of self. Theoretical issues include semiotics, psychoanalysis, structuralism, liminality, and critical theory. Prereq., ANTH 2100 or instructor consent. Same as ANTH 5520.

**ANTH 4530-3. Theoretical Foundations of Sociocultural Anthropology.** Critically examines the pivotal schools of 20th century social theory that have shaped modern sociocultural anthropology, including the ideas of cultural evolutionism, Marxism, Durkheim, Weber, Freud, structuralism, postmodernism, and contemporary anthropological approaches. Includes primary readings and seminar-style discussion. Prereq., ANTH 2100 or instructor consent. Same as ANTH 5530.

**ANTH 4540-3. Hunters and Gatherers.** Explores hunter-gatherer ways of life and the ways in which anthropologists have thought about those ways of life, using lectures, discussion, the professional literature, and film. Topics covered include the history of hunter-gatherer research, relations between this research and archaeological studies of the human past, critiques of classic hunter-gatherer studies, and the current status of hunting and gathering peoples. Prereqs., ANTH 2010, 2020, 2100, and 2200.

**ANTH 4560-3. North American Indian Acculturation.** Comprehensive survey of changes in the native cultures of America north of Mexico caused by occupation of the continent by Old World populations, including a review of processes of contact, environmental changes, changes in major institutions, the nature of federal/state administration, the reservation system, and contemporary developments. Restricted to senior ANTH or ETHN majors. Same as ETHN 4563 and ANTH 5560. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**ANTH 4570-3. Anthropology of Fishing.** Examines fishing methods, peoples, societies, and cultures, emphasizing anthropology's role in shaping fisheries management and development policy. Same as ANTH 5570.

**ANTH 4580-3. The Holocaust: An Anthropological Perspective.** Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics, and consequences as well as other genocides of the 20th century, using an anthropological approach. Restricted to juniors/seniors. Same as JWST 4580.

**ANTH 4600-3. Human Ecology: Cultural Aspects.** Examines the relationship between environment and human behavior, emphasizing social organization. Special attention given to examining the extent to which the environment influences subsistence strategies, settlement patterns, social relationships among different groups, and family structure.

**ANTH 4610-3. Medical Anthropology.** Cultural factors determine states of health and illness in both Western and non-Western societies. The transition from traditional to modern status creates new problems including population growth, aging, changing patterns of morbidity, mortality and health care, and new socioeconomic consequences. Same as ANTH 5610.

**ANTH 4620-3. Nationalism and Cultural Citizenship.** Explores the nature of ethnic conflict, nationalism, and cultural citizenship in different contexts, including the United States. Is the nation-state dead? What effect do extra-national and transnational organizations/institutions (e.g., European Union) have on the development of nationalism? Through the exploration of contemporary theory and case studies, this class will address these important contemporary concerns. Prereq., ANTH 2100.

**ANTH 4630-3. Nomadic Peoples of East Africa.** Examines the issues of current concern in the study of East African pastoral peoples. The first half of the course is devoted to historical perspectives and the second half explores the transition from subsistence to market oriented economies. Restricted to junior and senior ANTH majors. Same as ANTH 5630.

**ANTH 4690 (1-6). Anthropology of Tibet.** Explores the culture of Tibet in both historical and thematic manners, considering the long-term development of Tibetan cultural practices and institutions as well as many of the abrupt changes introduced to Tibet in the 20th century. Topics covered include region, politics, gender, warfare, poetry and literature, and life under Chinese rule and as refugees around the world. Prereq., ANTH 2100.

**ANTH 4710-3. Departmental Honors in Anthropology 1.** Course work built around theme of research design as a means of integrating previous training in the field of anthropology as well as providing an opportunity to perform creative scientific investigations. The course prepares students to write an honors thesis in ANTH 4720. Required of students doing Anthropology departmental honors. Restricted to sophomores, juniors, and seniors.

**ANTH 4720-3. Departmental Honors in Anthropology 2.** Continuation of ANTH 4710. Prereq., ANTH 4710.

**ANTH 4730-3. Latin American Politics and Culture through Film and Text.** Introduces students to the political cultures and societies of Latin America. Through historical and ethnographic text, and documentary and non-documentary cinema, this course will explore class relations, ideology, and resistance from the conquest to the present. Prereq., ANTH 2100. Same as ANTH 5730.

**ANTH 4740-3. Peoples and Cultures of Brazil.** Thematically surveys theoretical and ethnographic issues that have been important in understanding Brazil. Read and write critically about textual and visual representations of Brazil presented in the course. Prereq., ANTH 2100; three or more cultural anthropology courses recommended.

**ANTH 4750-3. Culture and Society in South Asia.** Intensive analysis of major issues in anthropological research on South Asia (India, Pakistan, Bangladesh, Nepal, and Sri Lanka), including kinship, gender, marriage, caste system, religion and ritual, ethnic conflict, and social change. Prereq., ANTH 2100 or instructor consent. Same as ANTH 5750.

**ANTH 4760-3. Ethnography of Southeast Asia and Indonesia.** Introduces the historical, political, and cultural dimensions of Southeast Asia, focusing primarily on Malaysia, the Philippines, Singapore, and Indonesia, with some coverage of mainland Southeast Asia. Prereq., ANTH 2100. Restricted to sophomores, juniors, and seniors. Same as ANTH 5760.

**ANTH 4800-3. Language and Culture.** Same as LING 4800.

**ANTH 4840 (1-6). Independent Study.** For upper-division undergraduate students. May be repeated up to 6 total credit hours.

**ANTH 4910 (1-3). Teaching Anthropology.** Practicum by special arrangement only. Students learn to teach anthropology by serving as recitation leaders or tutors in introductory courses or as small group leaders in advanced courses. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ANTH 4930 (1-6). Anthropology Internship.** Provides academically supervised opportunities for junior and senior anthropology majors and graduate students to work in public and private sectors on projects related to students' career goals. Relates classroom theory to practice. Requires at least 48 hours on the job per credit hour and evidence (paper, employer evaluation, work journal) of significant learning. May be repeated up to 9 total credit hours. Prereqs., ANTH 2010, 2100, and 2200, junior standing, anthropology major with a minimum 3.25 GPA, and departmental consent. Same as ANTH 5930.

**ANTH 5000-3. Quantitative Methods in Anthropology.** Same as ANTH 4000.

**ANTH 5020-3. Explorations in Anthropology.** Same as ANTH 4020.

**ANTH 5060-3. Nutrition and Anthropology.** Same as ANTH 4060.

**ANTH 5070-3. Methods in Biological Anthropology.** May be repeated up to 6 total credit hours. Same as ANTH 4070.

**ANTH 5110-3. Human Evolutionary Biology.** Same as ANTH 4110.

**ANTH 5120-3. Advanced Physical Anthropology.** Same as ANTH 4120.

**ANTH 5129-3. Aegean Art and Archaeology.** Same as ANTH 4129.

**ANTH 5130-3. Advanced Osteology.** Same as ANTH 4130.

**ANTH 5150-3. Human Ecology: Biological Aspects.** Same as ANTH 4150.

**ANTH 5170-3. Primate Evolutionary Biology.** Same as ANTH 4170.

**ANTH 5210-3. Southwestern Archaeology.** Same as ANTH 4210.

**ANTH 5220-3. From Olmec to Aztec: The Archaeology of Mexico.** Same as ANTH 4220.

**ANTH 5224-3. Archaeology of the Maya and Their Neighbors.** Same as ANTH 4224.

**ANTH 5240-3. Geoarchaeology.** Same as ANTH 4240.

**ANTH 5270-3. Plains Archaeology.** Same as ANTH 4270.

**ANTH 5330-3. Human Ecology: Archaeological Aspects.** Same as ANTH 4330.

**ANTH 5350 (2-6). Archaeological Field and Laboratory Research.** Same as ANTH 4350.

**ANTH 5380-3. Lithic Analysis and Replication.** Same as ANTH 4380.

**ANTH 5390-3. Research Methods in Archaeology 1.** Same as ANTH 4390.

**ANTH 5400-3. Research Methods in Archaeology 2.** Focuses on the design of research including constructing empirical arguments and testing them, data gathering, site formation processes, field strategies (archival resources, mapping, field survey, surface collecting/recording, excavation and preliminary analysis) and artifact analysis as it relates to research design.

**ANTH 5420-3. Archaeology of Ancient Egypt.** Same as ANTH 4420.

**ANTH 5430-3. Biblical Archaeology.** Same as ANTH 4430.

**ANTH 5440-3. Egyptian Hieroglyphics 1.** Same as ANTH 4440.

**ANTH 5460-3. Archaeology and Contemporary Society.** Same as ANTH 4460.

**ANTH 5500-3. Cross-Cultural Aspects of Socioeconomic Development.** Same as ANTH 4500.

**ANTH 5510-3. Applied Cultural Anthropology.** Same as ANTH 4510.

**ANTH 5520-3. Symbolic Anthropology.** Same as ANTH 4520.

**ANTH 5530-3. Theoretical Foundations of Sociocultural Anthropology.** Same as ANTH 4530.

**ANTH 5560-3. North American Indian Acculturation.** Same as ANTH 4560.

**ANTH 5570-3. Anthropology of Fishing.** Same as ANTH 4570.

**ANTH 5600-3. Human Ecology: Cultural Aspects.** Reviews and critically examines the major theoretical perspectives for understanding the relationship between human social behavior and the environment developed in the social sciences, especially anthropology, over the last 100 years.

**ANTH 5610-3. Medical Anthropology.** Same as ANTH 4610.

**ANTH 5630-3. Nomadic Peoples of East Africa.** Same as ANTH 4630.

**ANTH 5730-3. Latin American Politics and Culture through Film and Text.** Same as ANTH 4730.

**ANTH 5750-3. Culture and Society in South Asia.** Same as ANTH 4750.

**ANTH 5760-3. Ethnography of Southeast Asia and Indonesia.** Same as ANTH 4760.

**ANTH 5770-3. Core Course: Archaeology.** Provides a graduate-level overview of analytic issues relevant to all phases of archaeological research and of the diversity of theoretical perspectives within the field as a whole. Course is re-

quired for all first-year graduate students in anthropology. Prereq., graduate status in anthropology.

**ANTH 5780-3. Core Course: Cultural Anthropology.** Provides an intense, graduate-level introduction to the discipline of cultural anthropology, with an emphasis upon critically assessing those methods, theories, and works that have shaped the field from the 19th century to the present time. Required of all first-year graduate students in Anthropology. Restricted to anthropology graduate students or instructor consent.

**ANTH 5785-3. Advanced Seminar in Cultural Anthropology.** Details the history of theory and practice in contemporary cultural anthropology, considering the development of major theoretical schools of thought and the integration of general social theory within anthropology. Required of masters students in cultural anthropology. Restricted to ANTH graduate students or instructor consent.

**ANTH 5790-3. Core Course: Biological Anthropology.** Discusses how biological anthropologists use evidence and concepts from evolutionary theory, human biology, and ecology to understand the evolution, diversification, and adaptation of human populations. Required of all first-year graduate students in anthropology. Prereq., graduate status in anthropology.

**ANTH 5840 (1-6). Guided Study.** Directed individual research based on a specific area of specialization. May be repeated up to 6 total credit hours.

**ANTH 5930 (1-6). Anthropology Internship.** Same as ANTH 4930.

**ANTH 6150-3. Critical and Theoretical Issues in Museums.** Investigates key problems facing museum institutions and studies the staging and representation of historical knowledge, the ethics of collecting and display, the changing nature and uses of historical evidence, and relations between curatorial practice, collecting, and field work. Critically examines different approaches to museums and museology in various disciplines, both past and present. Prereq., MUSM 5011 or instructor consent. Same as MUSM 6150, HIST 6150, and ARTH 6150.

**ANTH 6320-3. Linguistic Anthropology.** Serves as an advanced introduction to the empirical and theoretical foundations of contemporary linguistic anthropology, with special emphasis on the ways in which culture and society emerge semiotically through language and discourse. Same as LING 6320.

**ANTH 6940-3. Candidate for Degree.**

**ANTH 6950 (1-6). Master's Thesis.**

**ANTH 7000-3. Seminar: Current Research Topics in Cultural Anthropology.** Discusses current research and theoretical issues in the field of cultural anthropology. May be repeated up to 6 total credit hours. Restricted to graduate students.

**ANTH 7010-3. Seminar: Contemporary Theory in Cultural Anthropology.** Addresses current theoretical perspectives in cultural anthropology and controversies surrounding them. Discusses science, history, interpretation, and postmodernism. Includes the relationship between theory and method as well as the production of ethnography. May be repeated up to 9 total credit hours.

**ANTH 7020-3. Seminar: Physical Anthropology.** In-depth discussion of selected topics in physical anthropology with emphasis on recent research. May be repeated up to 6 total credit hours.

**ANTH 7030-3. Seminar: Archaeology.** Intensive examination of selected theoretical or methodological topics in archaeology. Topics vary with current research emphasis. May be repeated up to 6 total credit hours.

**ANTH 7140-3. Seminar: Archaeology of Selected Areas.** Considers archaeology of a specified area, either geographical or topical. Areas selected in accordance with current research interests. May be repeated up to 9 total credit hours.

**ANTH 7300-3. Seminar: Research Methods in Cultural Anthropology.** May be repeated up to 6 total credit hours.

**ANTH 7620-3. Seminar: Ethnography and Cultural Theory.** Explores how ethnographic writing has evolved over the past century to incorporate different forms of cross-cultural representation and to accommodate new theoretical paradigms. Includes ethnographic authority and reflexivity, as well as embedded theories and blurred genres of cultural research.

**ANTH 7840 (1-6). Independent Research.** Research aimed at developing a solution to an originally conceived research problem. May be repeated up to 6 total credit hours.

**ANTH 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Applied Mathematics

**APPM 1340-3. Calculus 1 with Algebra, Part A.** Studies selected topics in analytical geometry and calculus: rates of change of functions, limits, derivatives and their applications. APPM 1340-1345 together are equivalent to APPM 1350. The sequence APPM 1340-1345 is specifically designed for students whose manipulative skills in the techniques of high school algebra and precalculus may be inadequate for APPM 1350. Prereqs., 2 years high school algebra, 1 year geometry, 1 semester trigonometry. Credit not granted for this course and MATH 1150.

**APPM 1345-3. Calculus 1 with Algebra, Part B.** Continuation of APPM 1340. Studies selected topics in calculus: derivatives and their applications, integration, differentiation and integration of transcendental functions. Algebraic and trigonometric topics are studied throughout, as needed. Prereq., APPM 1340. Credit not granted for this course and APPM 1350 or MATH 1300.

**APPM 1350-4. Calculus 1 for Engineers.** Topics in analytical geometry and calculus including limits, rates of change of functions, derivatives and integrals of algebraic and transcendental functions, applications of differentiations and integration. Prereqs., 2 years high school algebra, 1 year geometry, and 1/2 year trigonometry; or approval by faculty advisor. Credit not granted for this course and MATH 1080, 1081, 1090, 1100, 1300, 1310, APPM 1345, or ECON 1088. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**APPM 1360-4. Calculus 2 for Engineers.** Continuation of APPM 1350. Focuses on applications of the definite integral, methods of integration, improper integrals, Taylor's theorem, and infinite series. Prereqs., APPM 1350 or MATH 1300 (min. grade C-). Coreq., APPM 1720. Credit not granted for this course and MATH 2300.

**APPM 1710-3. Introduction to Games Development 1.** Designed for students with little or no programming background. Students learn to program with a tool such as ActionScript 3.0 using object-oriented techniques and classes offered by the programming language class hierarchy. Programs developed in the course address mathematical problems relating to such topics as carrying capacity, competition, and population cycle, among others. Coreq., APPM 1350. Same as ATLS 1710.

**APPM 1720-3. Introduction to Games Development 2.** Continuation of APPM 1710, this course addresses students with knowledge of a programming language such as ActionScript 3.0. Students learn to plan, develop and test Flash applications (games, simulations, and animations) that embody mathematical formulations of problems in areas such as transportation, nutrition, and alternative energy. Prereq., APPM 1710. Coreq., APPM 1360. Same as ATLS 1720.

**APPM 2350-4. Calculus 3 for Engineers.** Covers multivariable calculus, vector analysis, and theorems of Gauss, Green, and Stokes. Prereq., APPM 1360 or MATH 2300 (min. grade C-). Credit not granted for this course and MATH 2400.

**APPM 2360-4. Introduction to Differential Equations with Linear Algebra.** Introduces ordinary differential equations, systems of linear equations, matrices, determinants, vector spaces, linear transformations, and systems of linear differential equations. Prereq., APPM 1360 or MATH 2300 (min. grade C-). Credit not granted for this course and both MATH 3130 and 4430, both APPM 3310 and MATH 4430, or APPM 2380.

**APPM 2450-1. Calculus 3 Computer Lab.** Selected topics in analytic geometry and calculus with a focus on symbolic computation using Mathematica or Matlab. Coreq., APPM 2350.

**APPM 2460-1. Differential Equations Computer Lab.** Selected topics in differential equations and linear algebra with a focus on symbolic computation using Mathematica or Matlab. Coreq., APPM 2360.

**APPM 2750-4. Java: Training and Mathematical Algorithms.** Preparatory course for Java programming. Provides necessary background for Java language: basic object-oriented concepts, analysis, and design. Learn to create Java applets and applications, create graphic context, and identify the key features of Java foundation classes as well as other Java-related technology. Material is taught in the context of mathematical algorithms from calculus. Prereqs., APPM 1350 and programming experience. Recommended prereq., APPM 1360.

**APPM 3010-3. An Introduction to Nonlinear Systems: Chaos.** Both majors and minors in the physical sciences are introduced to classes of tools useful in the analysis of nonlinear systems. Prereqs., APPM 1360 and 2360.

**APPM 3050-3. Scientific Computing in Matlab.** Topics covered include: approximations in computing, computer arithmetic, interpolation, matrix computations, nonlinear equations, optimization, and initial-value problems with emphasis on the computational cost, efficiency, and accuracy of algorithms. The problem sets are application-oriented with examples taken from orbital mechanics, physics, genetics, and fluid dynamics. Prereqs., APPM 1360 and 2360.

**APPM 3170-3. Discrete Applied Mathematics.** Emphasizes selected applications of graph theory to computer science, engineering, operations research, social sciences, and biology. Topics include the basic properties of graphs and diagraphs, and their matrix representations. Relates graph properties to applications such as scheduling, architecture of parallel processors, gray codes, traveling salesman problems, and assignment problems. Prereq. or coreq., APPM 3310.

**APPM 3310-3. Matrix Methods and Applications.** Introduces linear algebra and matrices, with an emphasis on applications, including methods to solve systems of linear algebraic and linear ordinary differential equations. Discusses computational algorithms that implement these methods. Some applications in operations research may be included as time permits. Credit not granted for this course and MATH 3130. Prereq., APPM 2350.

**APPM 3570-3. Applied Probability.** Studies axioms, counting formulas, conditional probability, independence, random variables, continuous and discrete distribution, expectation, moment generating functions, law of large numbers, central limit theorem, Poisson process, and multivariate Gaussian distribution. Prereq., APPM 2350 or MATH 2400. Credit not granted for this course and ECEN 3810 or MATH 4510.

**APPM 4120-3. Introduction to Operations Research.** Studies linear and nonlinear programming, the simplex method, duality, sensitivity, transportation and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits. Prereqs., APPM 3310 or MATH 3130. Same as APPM 5120 and MATH 4120.

**APPM 4350-3. Methods in Applied Mathematics: Fourier Series and Boundary Value Problems.** Reviews ordinary differential equations, including solutions by Fourier series. Physical derivation of the classical linear partial differential equations (heat, wave, and Laplace equations). Solution of these equations via separation of variables, with Fourier series, Fourier integrals, and more general eigenfunction expansions. Prereqs., APPM 2350 and 2360 (min. grade C-). Coreq., APPM 3310. Same as APPM 5350.

**APPM 4360-3. Methods in Applied Mathematics: Complex Variables and Applications.** Introduces methods of complex variables, contour integration, and theory of residues. Applies solving partial differential equations by transform methods, Fourier and Laplace transforms, and Reimann-Hilbert boundary-value problems. Also applies conformal mapping to ideal fluid flow and/or electrostatics. Prereqs., APPM 2350 and 2360, or 3310 (min. grade C-) or instructor consent. Same as APPM 5360.

**APPM 4380-3. Modeling in Applied Mathematics.** An exposition of a variety of mathematical models arising in the physical and biological sciences. Students' modeling projects are presented in class. Topics can vary: GPS navigation, medical imaging, ocean waves, and computerized facial recognition. Prereqs., APPM 2350 and 2360. Recommended prereqs., APPM 3310, 4350, and 4650. Same as APPM 5380.

**APPM 4390-3. Modeling in Mathematical Biology.** Investigates how complex systems in biology can be studied using applied mathematics. Examines several case studies which include topics from microbiology, enzyme reaction ki-

netics, neuroscience, ecology, epidemiology, physiology, and bioengineering. Coreq., APPM 4350 or instructor consent. Same as APPM 5390.

**APPM 4440-3. Undergraduate Applied Analysis 1.** Provides a rigorous treatment of topics covered in Calculus 1 and 2. Topics include convergent sequences; continuous functions; differentiable functions; Darboux sums, Riemann sums, and integration; Taylor and power series and sequences of functions. Prereq., APPM 2350 and 2360 or equivalent. Coreq., APPM 3310.

**APPM 4450-3. Undergraduate Applied Analysis 2.** Continuation of APPM 4440. Study of multidimensional analysis including  $n$ -dimensional Euclidean space, continuity and uniform continuity of functions of several variables, differentiation, linear and nonlinear approximation, inverse function and implicit function theorems, and a short introduction to metric spaces. Prereqs., APPM 2350, 2360, and 4440.

**APPM 4520-3. Introduction to Mathematical Statistics.** Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness; tests of simple and composite hypotheses, linear models, and multiple regression analysis. Analyzes variance distribution-free methods. Prereq., MATH 4510 or APPM 3570. Same as APPM 5520 and MATH 4520.

**APPM 4540-3. Introduction to Time Series.** Single and multivariable regression, forecasting using regression models, time series models, and modeling with MA, AR, ARMA, and ARIMA models, forecasting with time series models, and spectral analysis. Prereqs., APPM 3570 or MATH 4510, and APPM 4520 or MATH 4520. Same as APPM 5540 and MATH 4540.

**APPM 4560-3. Markov Processes, Queues, and Monte Carlo Simulations.** Brief review of conditional probability and expectation followed by a study of Markov chains, both discrete and continuous time. Queuing theory, terminology, and single queue systems are studied with some introduction to networks of queues. Uses Monte Carlo simulation of random variables throughout the semester to gain insight into the processes under study. Prereq., APPM 3570 or equivalent. Same as APPM 5560.

**APPM 4570-3. Statistical Methods.** Covers discrete and continuous probability laws, random variables; expectations; laws of large numbers and central limit theorem; estimation, testing hypothesis, analysis of variance, regression analysis, and nonparametric methods. Emphasizes applications with an introduction to packaged computer programs. Prereq., APPM 1360 or equivalent Calculus 2 course. Same as APPM 5570.

**APPM 4580-3. Statistical Applications: Software and Methods.** Combines statistical methods with practical applications and computer software. Develops commonly used statistical models such as analysis of variance as well as linear and logistic regression. The statistical models are implemented and interpreted in the context of actual data sets using available statistical software. Continuation of APPM 4570. Prereq., APPM 4570 or any course in statistics. Same as APPM 5580.

**APPM 4650-3. Intermediate Numerical Analysis 1.** Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Prereqs., APPM 3310 or MATH 3130, and knowledge of a programming language. Same as MATH 4650.

**APPM 4660-3. Intermediate Numerical Analysis 2.** Continuation of APPM 4650. Examines numerical solution of initial-value problems and two-point boundary-value problems for ordinary differential equations. Also looks at numerical methods for solving partial differential equations. Prereq., APPM 4650 and knowledge of a programming language. Same as MATH 4660.

**APPM 4720 (1-3). Open Topics in Applied Mathematics.** Provides a vehicle for the development and presentation of new topics that may be incorporated into the core courses in applied mathematics. May be repeated up to 6 total credit hours. Prereqs., variable, depending on the topic. See instructor. Same as APPM 5720.

**APPM 4840 (1-3). Reading and Research in Applied Mathematics.** Introduces undergraduate students to the research foci of the Department of Applied Mathematics. May be repeated up to 9 total credit hours. Prereq., APPM 3310 or MATH 3130. Recommended prereq., a course in ordinary or partial differential equations.

**APPM 4950 (1-3). Seminar in Applied Mathematics.** Introduces undergraduate students to the research foci of the program in applied mathematics. It is also designed to be a capstone experience for the program's majors. May be repeated up to 6 total credit hours. Prereq., APPM 3310 or MATH 3130. Recommended prereq., course in ordinary or partial differential equations. Similar to APPM 4955.

**APPM 5040 (1-2). Calculus Applications for High School Teachers.** A fast-paced, intensive calculus course designed for high school mathematics teachers. Provides a deeper understanding of fundamental calculus concepts and an introduction to technological tools, including computer software used in the analysis of real-world problems. Offered through Continuing Education only. Prereqs., APPM 1350 and 1360. Recommended prereqs., APPM 2350 and 2360.

**APPM 5050 (1-2). Discrete Math for K–12 Teachers.** An intensive study of selected topics in discrete math, including Boolean algebra, inductive proofs, discrete probability, election theory and fair division, graph theory, and recursion. Focus on applications and technological tools to increase understanding. Offered through Continuing Education only. Prereq., one undergrad probability course. Recommended prereq., APPM 3310 or MATH 3130.

**APPM 5070 (1-2). Applied Statistics for High School Teachers.** A fast-paced, intensive course in statistics designed for high school mathematics teachers. Covers selected topics from probability and statistics, including random variables, central limit theorem, sampling design, regression, and interference. Uses technological tools, including Minitab and SPSS, to analyze real-world statistical problems. Offered through Continuing Education only. Prereq., undergraduate course in probability and statistics.

**APPM 5120-3. Introduction to Operations Research.** Same as APPM 4120 and MATH 5120.

**APPM 5350-3. Methods in Applied Mathematics: Fourier Series and Boundary Value Problems.** Restricted to graduate students. Same as APPM 4350.

**APPM 5360-3. Methods in Applied Mathematics: Complex Variables and Applications.** Prereq., graduate status in engineering or arts and sciences, or instructor consent. Same as APPM 4360.

**APPM 5380-3. Modeling in Applied Mathematics.** Same as APPM 4380.

**APPM 5390-3. Modeling in Mathematical Biology.** Same as APPM 4390.

**APPM 5430-3. Methods in Applied Mathematics: Applications of Complex Variables.** Reviews basic ideas of complex analysis, including solutions of ODEs and PDEs of physical interest via complex analysis; conformal mapping, including Schwarz-Christoffel transformations and generalizations; computational methods; Riemann-Hilbert problems; and topics in asymptotic methods. Prereq., APPM 4360 or 5360, or instructor consent.

**APPM 5440-3. Applied Analysis 1.** Discusses the elements of basic real and complex analysis, Banach spaces, LP spaces, and many relevant inequalities. Includes applications of existence and uniqueness of solutions to various types of ordinary differential equations, partial differential equations, and integral equations. Prereqs., MATH 4310 and 4320, or equivalent; MATH 3130 or equivalent; or instructor consent.

**APPM 5450-3. Applied Analysis 2.** Continuation of APPM 5440. Prereq., APPM 5440 or instructor consent.

**APPM 5460-3. Methods in Applied Mathematics: Dynamical Systems and Differential Equations and Chaos.** Introduces the theory and applications of dynamical systems through solutions to differential equations. Covers existence and uniqueness theory, local stability properties, qualitative analysis, global phase portraits, perturbation theory, and bifurcation theory. Special topics may include Melnikov methods, averaging methods, bifurcations to chaos, and Hamiltonian systems. Prereqs., undergraduate courses equivalent to APPM 2360, 3310, and MATH 4310.

**APPM 5470-3. Methods of Applied Mathematics: Partial Differential and Integral Equations.** Studies properties and solutions of partial differential equations. Covers methods of characteristics for partial differential equations, well-posed problems, main results for the well-known equations, Green's functions, and related integral equations. Prereqs., APPM 4350 and 4360, or MATH 4430, or equivalent.



**APPM 5480-3. Methods of Applied Mathematics: Approximation Methods.** Covers asymptotic evaluation of integrals (stationary phase and steepest descent), perturbation methods (regular and singular methods, and inner and outer expansions), multiple scale methods, and applications to differential and integral equations. Prereq., APPM 5470 or instructor consent.

**APPM 5520-3. Introduction to Mathematical Statistics.** Same as APPM 4520 and MATH 5520.

**APPM 5540-3. Introduction to Time Series.** Same as APPM 4540 and MATH 5540.

**APPM 5560-3. Markov Processes, Queues, and Monte Carlo Simulations.** Prereq., APPM 3570 or equivalent. Same as APPM 4560.

**APPM 5570-3. Statistical Methods.** Same as APPM 4570.

**APPM 5580-3. Statistical Applications: Software and Methods.** Continuation of APPM 5570. Prereq., one semester of statistics. Same as APPM 4580.

**APPM 5600-3. Numerical Analysis 1.** Solution of nonlinear algebraic equations, interpolation, integration, approximation, and numerical linear algebra. Prereq., APPM 3310 or MATH 3130, and experience with a scientific programming language.

**APPM 5610-3. Numerical Analysis 2.** Numerical linear algebra, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Prereq., APPM 5600 or MATH 5600.

**APPM 5720 (1-3). Open Topics in Applied Mathematics.** Same as APPM 4720.

**APPM 6520-3. Mathematical Statistics.** Emphasizes mathematical theory of statistics. Topics include distribution theory, estimation and testing of hypotheses, multivariate analysis, and nonparametric inference, all with emphasis on theory. Prereq., APPM 5520 or MATH 5520.

**APPM 6550-3. Introduction to Stochastic Processes.** Systematic study of Markov chains and some of the simpler Markov processes including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Prereqs., MATH 4310, MATH 4510 or APPM 3570, or APPM 4560, or instructor consent. Same as MATH 6550.

**APPM 6610-3. Introduction to Numerical Partial Differential Equations.** Covers finite difference, finite element, finite volume, pseudo-spectral, and spectral methods for elliptic, parabolic, and hyperbolic partial differential equations. Prereq., APPM 5600. Recommended prereq., APPM 5610 or graduate numerical linear algebra.

**APPM 6640-3. Multigrid Methods.** Develops a fundamental understanding of the principles and techniques of the multigrid methodology, which is a widely used numerical approach for solving many problems in such diverse areas as aerodynamics, astrophysics, chemistry, electromagnetics, hydrology, medical imaging, meteorology/oceanography, quantum mechanics, and statistical physics.

**APPM 6900 (1-6). Independent Study.** Introduces graduate students to research focuses of the Department of Applied Mathematics. Prereq., instructor consent.

**APPM 6940 (1-3). Master's Degree Candidate.**

**APPM 6950 (1-6). Master's Thesis.** May be repeated up to 12 total credit hours.

**APPM 7100-3. Mathematical Methods in Dynamical Systems.** Covers dynamical systems defined by mappings and differential equations. Hamiltonian mechanics, action-angle variables, results from KAM and bifurcation theory, phase plane analysis, Melnikov theory, strange attractors, chaos, etc. Prereq., APPM 5460.

**APPM 7300-3. Nonlinear Waves and Integrable Equations.** Includes basic results associated with linear dispersive wave systems, first-order nonlinear wave equations, nonlinear dispersive wave equations, solitons, and the methods of the inverse scattering transform. Prereqs., APPM 5470–5480, PHYS 5210, or instructor consent.

**APPM 7400 (1-3). Topics in Applied Mathematics.** Provides a vehicle for the development and presentation of new topics with the potential of being incorporated into the core courses in applied mathematics. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**APPM 7900 (1-3). Independent Study.** Introduces graduate students to research foci of the Department of Applied Mathematics. Prereq., instructor consent.

**APPM 8000-1. Colloquium in Applied Mathematics.** Introduces graduate students to the major research foci of the Department of Applied Mathematics. Prereq., instructor consent.

**APPM 8100-1. Seminar in Dynamical Systems.** Introduces advanced topics and research in dynamical systems. Prereq., instructor consent.

**APPM 8300-3. PDE and Analysis Seminar.** Introduces the core methods in the analysis of nonlinear partial differential and integral equations or systems to graduate students. Provides a vehicle for the development, presentation, and corporative research of new topics in PDE analysis. Prereq., APPM 5440.

**APPM 8600-1. Seminar in Computational Mathematics.** Introduces advanced topics and research in computational mathematics. Prereq., instructor consent.

**APPM 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. No more than 10 credit hours may be taken in any one semester.

## Arabic

*See Asian Languages.*

## Art and Art History

*BA students in art history are required to take FINE 1010 before taking 3000-level courses. A higher level of performance and extra work is expected of the graduate student. Seniors take 5000-level courses only after consultation with the instructor.*

### Foundations

**ARTS 1010-3. Introduction to Studio Art.** Presents creative activity conceptually, and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Fine arts majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development.

**ARTS 1020-3. Introduction to Studio Art 2.** Presents creative activity conceptually and art history thematically, with an interdisciplinary, experimental, and multicultural focus. Art and art history majors explore visual literacy and culture through presentations and student-centered projects that emphasize individual development. Prereq., ARTS 1010.

**ARTS 1030-3. Principles of Color.** Introduces the relative effects of color as used by the artist. Emphasizes the practice of color relations including basic characteristics, mixtures, illusions, optical mixture, color intervals, and color quantity. May not be repeated.

### Integrated Arts

**ARTS 4130-3. Integrated Media.** Encourages experimentation with media and integration of traditional areas of drawing, painting, sculpture, and photography. Covers two- and three-dimensional collage/semblage, correspondence art, artist's books, site-specific, performance, audio, and video art. Same as ARTS 5130.

**ARTS 4540-3. Generative Art.** Attends to the interdisciplinary pursuits of scientists, humanists, and anyone interested in creating works of visual art according to step by step procedures as in musical compositions, mathematical formulae, linguistic rules, computer programs, etc. Includes collaborative and individual projects. May be repeated up to 6 total credit hours. Same as ARTS 5540.

**ARTS 5130-3. Integrated Media.** Same as ARTS 4130.

**ARTS 5140-3. Integrated Arts Studio.** Explores the creative process through a series of conceptually-based studio exercises. Students are encouraged to work across traditional media boundaries as they address themes such as identity, place, spirituality, politics, and consumerism. Includes individual and

collaborative studio projects, as well as reading and writing about the course themes. May be repeated up to 9 total credit hours.

**ARTS 5150-3. Integrated Arts Seminar.** Investigates the conjunction of interdisciplinary concepts in the creation of art. Looks beyond traditional media to new sources for art-making. A curious intellect, combined with exceptional research skills, will be the basis for original writing and rigorous discussion.

**ARTS 5540-3. Generative Art.** Same as ARTS 4540.

## Photography

**ARTS 1171-3. Photography for Non-Majors.** Introduces techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends. Students must have an adjustable camera. Credit not granted for this course and ARTS 2171.

**ARTS 2171-3. Photography 1.** Introduces techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends. Students must have an adjustable camera. Prereqs., ARTS 1010, 1020, and either ARTH 1300 or 1400. Credit not granted for this course and ARTS 1171.

**ARTS 2191-3. Photography 2.** Explores more sophisticated technical and conceptual skills to the creative process. Prereq., ARTS 2171.

**ARTS 3191-3. Photography 3.** Continues the exploration of the possibility of individual photographic expression. Students are encouraged to discover and develop a personal position in relation to the medium. May be repeated up to 6 total credit hours. Prereq., ARTS 2191.

**ARTS 3841 (1-3). Undergraduate Independent Study: Photography.** Reserved only for special projects in photography, not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., ARTS 3191 or 4161. Requires a detailed proposal, instructor's signature, and departmental approval.

**ARTS 4161-3. Photography 4.** Explores advanced techniques and concepts of photography as art. Emphasizes photography as a means to formal and expressive ends. May be repeated up to 12 total credit hours. Prereq., ARTS 3191.

**ARTS 4171-3. New Directions in Photography.** Investigates the use of the photographic image in new, antique, or nonstandard ways including nonsilver, photosculpture, various color processes, photolanguage, photoinstallations, electronic media, performance, filmmaking, electrostatic art (copy machine), photobooks, photocollage, and audio/visual art. Course content changes each semester. May be repeated twice. Prereq., ARTS 3191 or equivalent. Same as ARTS 5171.

**ARTS 4191-3. Digital Photography in Mongolia.** Offered through summer study abroad program only. May be repeated up to 6 total credit hours. Digital camera and working knowledge of its operating system is required. A lap top computer, Photoshop software, and ability to work in a developing nation are recommended. Same as ARTS 5191. Approved for arts and sciences core curriculum: human diversity.

**ARTS 5161-3. Graduate Photography.** May be repeated up to 18 total credit hours.

**ARTS 5171-3. New Directions in Photography.** May be repeated up 9 total credit hours. Same as ARTS 4171.

**ARTS 5191-3. Digital Photography in Mongolia.** Same as ARTS 4191.

**ARTS 5901 (1-3). Graduate Independent Study: Photography.** May be repeated up to 6 total credit hours.

## Painting/Drawing

**ARTS 1002-3. Beginning Drawing 1.** In this studio course the formal visual elements are presented through a study of spatial relationships. The course is built around a series of related problems, each of which is designed to develop fluency in drawing, offer experience in handling media, foster self-confidence, and promote an understanding of the visual elements and their role in the development of pictorial space. Prereqs., ARTS 1010, 1020, and 1030.

**ARTS 1012-3. Drawing for Non-Majors.** Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated.

**ARTS 1202-3. Beginning Painting 1.** The aim of this course is to develop the basic skills, techniques and processes of painting with an understanding of basic color principles. This integration of paint application and color principle will develop awareness that painting and color are used, not only as mediums for representation, but also as mediums for expressive purposes. Demonstrations, lectures, group and individual critiques will be given throughout the course. Prereqs., ARTS 1010, 1020, and 1030.

**ARTS 1212-3. Painting for Non-Majors.** Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. May not be repeated.

**ARTS 2002-3. Figure Drawing.** Explores varied drawing techniques and media. Introduces concepts relevant to the understanding of drawing and the creative process. May not be repeated. Prereqs., ARTS 1010, 1020, and either ARTH 1300 or 1400.

**ARTS 2202-3. Figure Painting.** Explores varied painting techniques. Introduces concepts relevant to the understanding of painting and the creative process. May not be repeated. Prereqs., ARTS 1010, 1020, and either ARTH 1300 or 1400.

**ARTS 3002-3. Drawing Alternative Process/Materials.** Continuation of Drawing 2. Offers creative possibilities in drawing and related media. Emphasizes experimentation and individual expression. Content varies by semester according to instructor; contact individual instructor for more information. May be repeated once. Prereq., ARTS 2002.

**ARTS 3202-3. Painting Alternative Process/Materials.** Continuation of Painting 2. Offers creative possibilities in painting and related media. Emphasizes experimentation and individual expression. Content varies by semester according to instructor; contact individual instructor for more information. May be repeated once. Prereq., ARTS 2202.

**ARTS 3702-3. Special Focus in Painting and Drawing.** Offers varied focus and special topics in painting, drawing, and related media to explore specialized directions and creative possibilities. Emphasizes experimentation. Content varies by semester; contact individual instructor for more information. May be repeated up to 6 total credit hours. Prereq., ARTS 2002 or 2202. Recommended prereq., ARTS 3002 or 3202.

**ARTS 3842 (1-3). Undergraduate Independent Study: Painting.** Reserved for special projects in painting not offered in the curriculum. May be repeated up to 6 total credit hours. Prereqs., ARTS 3202 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval.

**ARTS 3852 (1-3). Undergraduate Independent Study: Drawing.** Reserved for special projects in drawing not offered in the curriculum. May be repeated up to 6 total credit hours. Prereqs., ARTS 3002 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval.

**ARTS 4002-3. Advanced Drawing/Portfolio.** Continuation of Drawing 3. Advanced studio class in drawing for creative expression and individual portfolio development. Emphasis varies by semester; contact individual instructor for more information. May be repeated up to 12 total credit hours. Prereq., ARTS 3002.

**ARTS 4202-3. Advanced Painting/Portfolio.** Continuation of Painting 3. Advanced studio class in painting for creative expression and individual portfolio development. Emphasis varies by semester; contact individual instructor for more information. May be repeated up to 12 total credit hours. Prereq., ARTS 3202.

**ARTS 5202-3. Graduate Painting.** May be repeated up to 18 total credit hours.

**ARTS 5852 (1-3). Graduate Independent Study: Painting.** May be repeated up to 6 total credit hours.

## Printmaking

**ARTS 1003-3. Printmaking for Non-Majors.** Emphasizes processes involved with both nonmultiple and multiple methods, including but not limited to metal plate etching (intaglio), lithography, collagraph, woodcut, linoleum cut, Xerox transfer, and monotype. Places equal emphases on developing drawing skills and understanding design principles.

**ARTS 3403-3. Intaglio and Relief 1.** Introduces the study and experimentation of intaglio and relief processes in black and white, color, and possible photo imagery. May be repeated once. Not available for freshmen. Taught with ARTS 4403/5403.

**ARTS 3413-3. Lithography 1.** Introduces the study of stone and metal plate lithography, emphasizing individual creative development in black and white and further development in color printing processes. May be repeated once. Not available to freshmen. Taught with ARTS 4413/5413.

**ARTS 3423-3. Screen Printing 1.** Introduces the study of silkscreen techniques, emphasizing creativity, individual development, and experimentation in contemporary silkscreen processes. May be repeated once. Not available to freshmen.

**ARTS 3843 (1-3). Undergraduate Independent Study: Printmaking.** Reserved for special projects in printmaking not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., level 1 in a related area. Requires a detailed proposal, instructor's sponsorship, and departmental approval.

**ARTS 4403-3. Intaglio and Relief 2.** Continues the study and experimentation of intaglio and relief processes in black and white, color, digital imagery, and nontoxic processes as much as possible. May be repeated up to 12 total credit hours. Prereq., ARTS 3403. Taught with ARTS 3403/5403.

**ARTS 4413-3. Lithography 2.** Continues the study of stone and metal plate lithography, emphasizing individual creative development in black and white, and further development in color printing processes. In addition, digital imaging and nontoxic processes are emphasized as much as possible. May be repeated up to 12 total credit hours. Prereq., ARTS 3413. Taught with ARTS 3413/5413.

**ARTS 4423-3. Screen Printing 2.** Introduces advanced screen printing technology, emphasizing individual creativity and the ability to resolve problems of two-dimensional form. May be repeated up to 12 total credit hours. Prereq., ARTS 3423.

**ARTS 4433-3. Alternative Printmaking (Non-Toxic).** Introduces computer-generated imaging and developing ideas as related to traditional forms of Printmaking. Emphasizes original development of ideas and skills involved in learning advanced printing processes in Lithography and Intaglio media. May be repeated up to 12 total credit hours. Same as ARTS 5433.

**ARTS 4443-3. Papermaking.** Introduces papermaking as the study of plant fibers and cellulose structure relating to the making of paper pulp as an art medium. Emphasizes creative use of the paper pulp as related to two- and three-dimension form. May be repeated up to 6 total credit hours. Same as ARTS 5443.

**ARTS 4453-3. Monotype Printing.** Introduces monotype printing, with the uniqueness and diversity of its methods of producing art. The process uses some of the best qualities of painting, print making, and drawing. Emphasizes creative individual development, along with processes inherent to this media. May be repeated once. Same as ARTS 5453.

**ARTS 5403-3. Graduate Intaglio and Relief.** May be repeated up to 18 total credit hours. Taught with ARTS 3403/4403.

**ARTS 5413-3. Graduate Lithography.** May be repeated up to 18 total credit hours. Taught with ARTS 3413/4413.

**ARTS 5423-3. Graduate Screen Printing.** May be repeated up to 18 total credit hours.

**ARTS 5433-3. Graduate Alternative Printmaking (Non-Toxic).** Same as ARTS 4433.

**ARTS 5443-3. Graduate Papermaking.** Same as ARTS 4443.

**ARTS 5453-3. Graduate Monotype Printing.** Same as ARTS 4453.

**ARTS 5843 (1-3). Graduate Independent Study: Printmaking.** May be repeated up to 6 total credit hours.

## Sculpture

**ARTS 1514-3. Sculpture for Non-Majors.** Offers an orientation involving three-dimensional form and application. Studies expressive problems based on non-objective form relationships in various sculptural materials. May not be repeated.

**ARTS 2504-3. Sculpture 2: Materials and Techniques.** Explores a variety of materials, methods, and techniques and their application with reference to contemporary sculpture, i.e., moldmaking, welding, casting, photo techniques, and woodworking.

**ARTS 2524-3. Sculpture 2: Visual Thinking in Three-Dimensional Form.** Explores ideas concerning the structure and nature of visual thinking and their relationship to the creative thought process. Also investigates form in terms of the organizing principles of three-dimensional design and its application to contemporary sculpture. Includes lecture and studio projects. May be repeated up to 6 total credit hours.

**ARTS 3504-3. Sculpture 3: Experiments 1.** Explores materials, methods, and techniques through a series of assignments emphasizing individual ideas and their relationship to contemporary aesthetics. Prereqs., ARTS 2504 and 2524.

**ARTS 3514-3. Sculpture 3: Experiments 2.** Explores individual concepts and ideas and their relationship to contemporary issues and aesthetics. A series of assignments are worked out with the instructor based on individual interest. Prereq., ARTS 3504.

**ARTS 3844 (1-3). Undergraduate Independent Study: Sculpture.** Reserved for special projects in sculpture not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., ARTS 3504 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval.

**ARTS 4104-3. Performance/Installation.** Primarily focuses upon personal imagery as a live situation occurring in either an invented constructed reality or real environment. Work may be individual or group configuration, and may also take on the visual linguistic form of a solo performance or of a multimedia presentation. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400. May be repeated up to 6 total credit hours with instructor consent. Same as ARTS 5104.

**ARTS 4504-3. Sculpture 4.** Individual studies in selected media. May be repeated up to 6 total credit hours. Prereqs., ARTS 3504 and 3514.

**ARTS 5104-3. Graduate Performance/Installation.** May be repeated up to 6 total credit hours with instructor consent. Same as ARTS 4104.

**ARTS 5504-3. Graduate Sculpture.** May be repeated up to 18 credit hours.

**ARTS 5844 (1-3). Graduate Independent Study: Sculpture.** May be repeated up to 6 total credit hours.

## Ceramics

**ARTS 1875-3. Ceramics for Non-Majors.** Encompasses broad and fundamental uses of clay. Basic instruction and demonstration of throwing, hand building, and primitive clay forming methods. Investigates utility, function, and ceramics in the broader context of contemporary art. Slide presentations explore historical and contemporary attitudes involving ceramics.

**ARTS 2085-3. Ceramics 2: Handbuilding.** Introduces techniques of hand-built clay forms as they relate to function and nonfunction. Various clay techniques, glazing, and firing procedures are explored. Emphasizes ceramics in the broader context of contemporary art. May not be repeated. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400.

**ARTS 2095-3. Ceramics 2: Wheelthrowing.** Introduces techniques of wheel-thrown forms as they relate to function and nonfunction. Explores various glazing and firing methods. May not be repeated. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400.

**ARTS 3085-3. Ceramics 3.** Deals with further exploration of techniques approached in ARTH 2085 and 2095. Students are encouraged to develop personal concentration in relation to medium. May be repeated once. Prereqs., ARTS 2085, 2095.

**ARTS 3845 (1-3). Undergraduate Independent Study: Ceramics.** Reserved for special projects in ceramics not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., ARTS 3085 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval.

**ARTS 4085-3. Ceramics 4.** Includes lectures, research, and experimentation in clay (wheel and hand construction techniques). May be repeated up to 12 total credit hours. Prereq., ARTS 3085.

**ARTS 4095-3. Special Topics in Ceramics.** Designed for students majoring in ceramics. May be repeated up to 9 total credit hours. Taught with ARTS 5095. Prereq., ARTS 3085. Restricted to majors.

**ARTS 5075-3. Graduate Ceramics.** May be repeated up to 18 total credit hours.

**ARTS 5095-3. Graduate Special Topics in Ceramics.** Taught with ARTS 4095.

## Media Arts

**ARTS 2126-3. Digital Art 1.** An introductory course in the use of the personal computer to create and process images in the visual arts. Prereq., ARTS 1010, 1020 and ARTH 1300 or 1400.

**ARTS 3196-3. Photo-Imaging.** Introduces techniques, software, and related concepts of digital photography as art. Emphasizes digital photography as a means to formal and expressive ends. Prereq., ARTS 1171.

**ARTS 3236-3. Electronic Arts Survey.** Explores the development of video as an art form through tape screenings, readings, lectures, and discussions. Prerequisite for further studies in video production.

**ARTS 3906 (1-3). Undergraduate Independent Study: Video.** Reserved for special projects in video not offered in the curriculum. Maybe repeated up to 6 total credit hours. Prereq., ARTS 4246 and instructor consent. Requires a detailed proposal, instructor's sponsorship, and departmental approval.

**ARTS 4126-3. Digital Art 2.** Offers studio experience using personal computer in the generation and processing of imagery in the visual arts. Prereq., ARTS 2126. Same as ARTS 5126.

**ARTS 4176-3. New Directions in Digital Art.** Investigates the use of digital art in various contexts including digital narrative, web publishing, Internet art, multimedia performance, animation, conceptual art, information art, sound art, language art, and network installations. Prereqs., ARTS 2126 and 4316/5316 or instructor consent. Same as ARTS 5176.

**ARTS 4196-3. Advanced Photo-Imaging.** Offers an in-depth exploration of digital imaging in the context of the history, aesthetics, and tradition of photography as contemporary art. Emphasis is on digital manipulation, output, and individual growth and development. Prereq., ARTS 2191 or advanced standing in photography or media arts. Same as ARTS 5196.

**ARTS 4226-3. Advanced Computer Imaging.** Explores advanced techniques and concepts of digital image-making. Emphasizes the creative application of computer imaging in the production of visual art through individual projects. Prereq., ARTS 4126. Restricted to junior or senior ARTS or ARTH majors. Same as ARTS 5226.

**ARTS 4236-3. Electronic Arts Survey 2.** Continuation of electronic arts survey. Explores the development of video as an art form. Prerequisite for further studies in video production. Same as ARTS 5236.

**ARTS 4246-3. Beginning Video Production.** Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400 or instructor consent. Same as ARTS 5246 and FILM 4240.

**ARTS 4316-3. History and Theory of Digital Art.** Explores the history and theory of digital art. Discussion topics include the emergence of Internet art, hypertext, new media theory, online exhibitions, web publishing, virtual reality, and the networked interface. Includes collaborative and individual projects. Prereq., ARTS 2126 or instructor consent. Same as ARTS 5316.

**ARTS 4346-3. Intermediate Video Production.** Continuation of beginning video production. Extends the knowledge of single camera video production strategies and concepts. Expands the concept of montage (editing) and strategies to develop a video project through class screenings, projects, discussions, and readings. Furthers theoretical understanding of video as an art form. Prereq., ARTS 4246 or instructor consent. Same as ARTS 5346 and FILM 4340.

**ARTS 4446-3. Advanced Video Production.** Continuation of intermediate video production. Explores advanced technical skills to control the quality of

the video image in production, postproduction, and distribution. Emphasizes self-motivated independent projects, conceptual realization of advanced student work and basic working knowledge of distribution and life as a media artist. Promotes further theoretical understanding of video as an art form. May be repeated up to 9 total credit hours. Prereq., ARTS 4346 or instructor consent. Same as ARTS 5446 & FILM 4440.

**ARTS 5126-3. Graduate Digital Art 2.** Same as ARTS 4126.

**ARTS 5176-3. Graduate New Directions in Digital Art.** Same as ARTS 4176.

**ARTS 5196-3. Graduate Advanced Photo-Imaging.** Same as ARTS 4196.

**ARTS 5226-3. Graduate Advanced Computer Imaging.** May be repeated up to 6 total credit hours. Prereq., ARTS 5126. Same as ARTS 4226.

**ARTS 5236-3. Graduate Electronic Arts Survey 2.** Same as ARTS 4236.

**ARTS 5246-3. Graduate Beginning Video Production.** Same as ARTS 4246.

**ARTS 5316-3. Graduate History and Theory of Digital Arts.** Same as ARTS 4316.

**ARTS 5346-3. Graduate Intermediate Video Production.** Prereq., ARTS 4246/5246. Same as ARTS 4346.

**ARTS 5446-3. Graduate Advanced Video Production.** Same as ARTS 4446.

**ARTS 5846 (1-3). Graduate Independent Study: Video.** May be repeated up to 6 total credit hours.

## Seminars/Special Topics

**ARTS 3017 (1-3). Special Topics in Studio Arts.** Introduces timely subjects in studio arts courses that cannot be offered on a regular basis. Information concerning the topics in any given semester is available prior to pre-registration from the department of Art and Art History. May be repeated up to 7 total credit hours. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400. Restricted to juniors and seniors.

**ARTS 3097 (1-3). Special Topics: Non-Studio.** Introduces timely subjects in fine arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to preregistration from the Department of Art and Art History. May be repeated up to 7 total credit hours. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400. Restricted to juniors and seniors.

**ARTS 3847 (1-3). Independent Study.** Reserved for special projects not offered in the curriculum. May be repeated up to 6 total credit hours. Prereq., detailed proposal, instructor sponsorship, and departmental approval.

**ARTS 3937 (1-6). Internship.** Gives upper-division students the opportunity to work in public or private organizations on assignments relating to their career goals, and allows them to explore the relationship between theory and practice in their major. May be repeated up to 6 total credit hours.

**ARTS 4017 (1-3). Special Topics in Studio Arts.** Introduces timely subjects in studio art courses that cannot be offered on a regular basis. Information on topics in any given semester is available prior to pre-registration in departmental office. May be repeated up to 18 total credit hours. Prereq., ARTS 1010, 1020 and ARTH 1300 or 1400. Restricted to juniors and seniors. Same as ARTS 5017.

**ARTS 4087-3. Selected Topics in Contemporary Art.** Selectively studies significant areas of visual art of the last decade including major critical opinions. May be repeated up to 9 total credit hours. Prereq., 20 hours of ARTS or ARTH courses. Same as ARTS 5087.

**ARTS 4097 (1-3). Special Topics: Non-Studio.** Introduces timely subjects in the visual arts that cannot be offered on a regular basis. Information concerning the topics offered in any given semester is available prior to pre-registration from the fine arts department. May be repeated up to 6 total credit hours. Prereqs., ARTS 1010, 1020 and ARTH 1300 or 1400. Same as ARTS 5097.

**ARTS 4107 (1-3). Special Topics.** See online Schedule Planner for topic. May be repeated up to 3 total credit hours.

**ARTS 4117-3. BFA Seminar.** For students intending to pursue graduate work and/or a professional career in art. Emphasizes the development of a critical overview of their work and interests and how they relate to the problems of professional activity. Prereq., BFA candidate and senior standing.

**ARTS 4127-3. Art from Nature.** Provides an opportunity for advanced students to create nature based art. Studio work and/or appropriate on-site works will be generated through readings and individual and group experiences of nature. Prereq., one 4000 level studio course. Same as ARTS 5127.

**ARTS 4137-3. Curatorial Seminar.** Introduces curatorial practices, such as exhibition development, programming, and preparation of educational materials. Emphasizes the application of art history skills in the museum field, research, writing, and analytical and interpretive skills. Students participate in organizing exhibitions at the CU Art Museum. May be repeated up to 12 total credit hours. Same as ARTS 5137.

**ARTS 4717 (1-3). Studio Critique.** Consists of consultations with faculty on individual studio problems and projects. May be repeated up to 6 total credit hours. Prereqs., junior standing and instructor consent.

**ARTS 4957-3. Studio Honors Thesis.** May be elected during the final semester. Consists of a substantial, original, creative project and/or written thesis providing an art world context. Requires faculty sponsorship. Does not guarantee a student will receive honors. Same as FINE 4008.

**ARTS 5017 (1-3). Special Topics in Studio Arts.** May be repeated up to 6 total credit hours. Same as ARTS 4017.

**ARTS 5087-3. Selected Topics in Contemporary Art.** Same as ARTS 4087.

**ARTS 5097 (1-3). Special Topics: Non-Studio.** May be repeated up to 6 total credit hours. Same as ARTS 4097.

**ARTS 5107 (1-3). Special Topics.** See online Schedule Planner for topic. May be repeated up to 7 total credit hours.

**ARTS 5117-3. Graduate Art Seminar.**

**ARTS 5127-3. Art from Nature.** Same as ARTS 4127.

**ARTS 5137-3. Graduate Curatorial Seminar.** Same as ARTS 4137.

**ARTS 5717 (1-3). Graduate Studio Critique.** May be repeated up to 6 total credit hours with any single faculty member. Prereq., graduate standing and/or instructor consent.

**ARTS 5857 (1-3). Graduate Independent Study.** May be repeated up to 6 total credit hours.

**ARTS 5917-3. MFA Practicum.** Guides and supervises graduate student teachers. Students receive practical experience to organize and implement the teaching of fine arts at an introductory level. Includes a discussion of various teaching methodologies with an emphasis on cultural diversity.

**ARTS 6957 (1-6). Master of Fine Arts Creative Thesis.**

## Visiting Artist Program

**ARTS 4118-3. Visiting Artist Program.** Artists of national and international reputation, interacting with graduate and advanced undergraduate students, discuss their studio work at seminar meetings and at public lectures or events. Provides continuous input of significant developments and a comprehensive view of contemporary issues in the arts. May be repeated once. Prereq., portfolio review for undergraduates and senior standing. Same as ARTS 5118.

**ARTS 5118-3. Graduate Visiting Artist Program.** Same as ARTS 4118.

## Graduate Film Courses

**ARTF 5000-3. Advanced Digital Postproduction.** class explores the advanced practices and aesthetics of computer-based moving-image art editing. Topics include how to edit and manage a postproduction cycle, how to use digital editing systems and capabilities such as compositing, digital audio, and optical effects treatments. Prereqs., FILM 1502, 2000 or 2300, 2500, and 3400 or 3600, or instructor consent. Cannot be taken simultaneously with FILM 3400 or 3600. Same as FILM 4000.

**ARTF 5003-3. Film and Fiction.** Explores similarities and differences between literature and film as narrative arts. Studies several novels, short stories, and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting. Same as FILM 4003.

**ARTF 5004-3. Topics in Film Theory.** Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the

topic area, analyze and summarize arguments as presented in the literature, write "position" papers, and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials. May be repeated up to 6 total credit hours. Prereq., FILM 3051 or instructor consent. Restricted to senior FILM, FMST, or HUMN majors. Same as FILM 4004.

**ARTF 5010 (1-3). Topics in Film Studies: Production.** Prepares students for advanced Film Studies production courses. Subject matter varies each semester. May be repeated up to 9 total credit hours, provided the topics are different. Same as FILM 4010.

**ARTF 5013-3. Film, Photography, and Modernism.** Provides interdisciplinary study of film, photography, and modernism, focusing on issues such as dystopia, alienation, sexuality, subjectivity, and self-referentiality. Photographs by Stieglitz, Strand, Weston, Evans, Cartier-Bresson, Kertesz, and Moholy-Nagy. Films by Dziga-Vertov, Eisenstein, Resnais, Antonioni, Bergman, Bunuel, and Bertolucci. Prereq., FILM 1502. Recommended prereq., FILM 3051. Same as FILM 4013.

**ARTF 5021-3. Directing/Acting for the Camera.** Offers an intensive workshop that provides students with experience directing dramatic material, acting before a camera, and interpreting or adopting dramatic material for film. No experience in directing or acting required. Attendance, research, and papers required. Recommended prereq., FILM 1502. Same as FILM 4021.

**ARTF 5023-3. Topics in International Cinema.** Focuses on major international filmmakers who have had a decisive impact on world cinema. Students will learn how directors create their own innovative body of work with specific formal and thematic patterns, and will also learn to place such work within multiple frameworks that will cover film history, theory, aesthetics, philosophy, and social and cultural analysis. May be repeated up to 6 total credit hours provided topics are different. Prereq., FILM 1502. Recommended prereqs., FILM 3051 and 3061. Same as FILM 4023.

**ARTF 5024-3. Advanced Research Seminar.** Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade. May be repeated up to 6 total credit hours. Prereq., FILM 1502. Recommended prereqs., FILM 3051, 3061. Same as FILM 4024.

**ARTF 5030-3. Visiting Filmmakers Seminar.** Examines creative issues in contemporary cinema art. Graduate and advanced undergraduate students explore filmmaking ideas with guest artists within a seminar setting. Filmmakers, videographers and programmers of national and international reputation, with an emphasis on "experimental" practice, interact with graduate and advanced undergraduate students, and discuss their work at seminar meetings, public lectures or events. May be repeated up to 6 total credit hours. Recommended prereqs., FILM 1502 and 4453 or instructor consent. Same as FILM 4030.

**ARTF 5043 (1-3). Topics in Film Studies-Critical Studies.** Prepares students for advanced Film Studies critical studies courses. Subject matter varies each semester. May be repeated up to 9 total credit hours, provided the topics are different. Same as FILM 4043.

**ARTF 5105-3. Advanced Screenwriting.** Introduces professional screenwriting, in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio. Prereq., approved writing sample. Recommended prereqs., FILM 3051 and 3061. Same as FILM 4105.

**ARTF 5453-3. Elective Affinities: Avant-Garde Film and the Arts.** Traces the history and aesthetics of avant-garde/experimental films in light of similar ideas found in the other arts, particularly painting, poetry, photography and music. Topics covered include Dada and the early avant-garde; surrealism and psychodramas; Brakhage and abstract expressionism; feminist arts and film since the 1980s; the idea of the sublime in painting, music, and film; landscape in painting, photography, and film; post-modernism and the cinema; queer theory, gender/identity politics, and aesthetics of recent films; and specific multiple disciplinary artists such as Andy Warhol, Michael Snow, Helen Levitt, and Gunvor Nelson. Prereq., FILM 1502. Same as FILM 4453.

**ARTF 5500-3. Cinema Production 2.** Advanced exploration of creative cinema production through short production and post-production projects. Course focuses on the tactics and strategies of independent cinema production exploring either documentary, experimental, or narrative genres. May be repeated up to 9 total credit hours. Prereq., FILM 3400. Same as FILM 4500.

**ARTF 5600-3. Creative Digital Cinematography.** Explores creative approaches to single camera digital cinematography through short projects, discussions, and screenings. Relates creative photography and poetic approaches to the digital camera cinema. May be repeated up to 9 total credit hours. Prereqs., FILM 2000, 3600, or ARTS 4246 OR 5346 or instructor consent. Restricted to FILM majors. Same as FILM 4600.

**ARTF 5604-3. Colloquium in Film Aesthetics.** Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film. May be repeated up to 6 total credit hours. Same as FILM 4604.

**ARTF 5610-3. Image-makers Graduate Seminar.** Explores advanced graduate studio work in a seminar setting. The course will focus on the development of ideas and activities which advance creative image making. May be repeated up to 12 total credit hours.

**ARTF 5717 (1-3). Graduate Studio Critique.** May be repeated up to 6 total credit hours with any single faculty member. Prereq., graduate standing and/or instructor consent.

**ARTF 5846 (1-3). Graduate Independent Study: Video.** Participate in graduate independent study. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**ARTF 5857 (1-3). Graduate Independent Study.** Participate in graduate independent study. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**ARTF 6959 (1-6). Master's Thesis Film.** Preparation, research, writing of critical studies Master's thesis in fulfillment of concurrent BAMA in Film. Prereq., ARTF 5004. May be repeated up to 6 total credit hours.

## Art History

**ARTH 1300-3. History of World Art 1.** Surveys major art styles from the Paleolithic period through the Renaissance, including European, Asian, and the Pre-Columbian/Islamic world. Emphasizes comparison of Western and non-Western visual expressions as evidence of differing cultural orientations. Credit not granted for this course and FINE 1309. Approved for arts and sciences core and curriculum: literature and the arts.

**ARTH 1400-3. History of World Art 2.** Surveys major art styles from about 1600 to the present, including Europe, Asia, the Islamic world, the Americas, and tribal arts. Emphasizes comparison of Western and non-Western visual expressions as evidence of differing cultural orientations. Credit not granted for this course and FINE 1409. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 1509-4. Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World.** Introduces the art and archaeology of ancient Egypt, Mesopotamia, Greece, and Rome, examining various ancient approaches to power, religion, death, and the human body. Analyzes art, architecture, and everyday trash to learn about ancient humanity. Same as CLAS 1509. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**ARTH 2019-3. Pompeii and the Cities of Vesuvius.** Introduces the towns and villas buried by the eruption of Mt. Vesuvius in 79 C.E. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations. Same as CLAS 2019. Approved for arts and sciences core curriculum: historical context.

**ARTH 2409-3. Asian Art.** Designed for those having no previous experience in the study of Asian art. Traces development of sculpture, painting, architecture, and the other visual arts of South Asia, the Far East, and Southeast Asia, with a synopsis of developments from 1453 through the 18th century. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 3009-3. Critical Thinking in Art History.** Through structured discussions, selected readings, and written assignments provides an understanding

of how art history has evolved as an academic discipline and how art historians evaluate complex issues of style, form, content, and theory in the visual arts. Prereqs., ARTH 1300, 1400.

**ARTH 3029-3. Medieval and Early Modern Visual Culture, A.D. 400–1750.** Introduces students to the literature, history, culture and art of Europe and the Mediterranean basin from late antiquity through the early modern period. Interdisciplinary approach to visual culture focuses on uses of sacred religious practices and lay devotion. Prereqs., ARTH 1300 and 1400. Credit not granted for this course and FINE 2029.

**ARTH 3039-3. Greek Art and Archaeology.** Covers prehistoric Aegean through the fourth century B.C.E., considering architecture, pottery, painting, sculpture, and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Credit not granted for this course and FINE/CLAS 1009. Same as CLAS 3039. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 3049-3. Introduction to Roman Art and Architecture.** Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.E.) to Constantine (306–307 C.E.). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces. Same as CLAS 3049. Credit not granted for this course and FINE 1019 or CLAS 1019. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 3079-3. Medieval Art Survey.** Surveys the history of Western art from Constantine to around the year 1300, including Carolingian, Ottonian, Anglo-Saxon, Romanesque, and Gothic. Considers “barbarian,” Byzantine, and Islamic influences. Prereqs., ARTH 1300, 1400.

**ARTH 3109-3. Art in Contemporary Society.** Examines writings by philosophers and art critics as they address the question: What is art for? Readings focus on the 19th and 20th centuries, including current theories and some non-Western theories. Students are encouraged to develop their own responses to the question. Prereqs., ARTH 1300 and 1400.

**ARTH 3209-3. Art, Culture, and Gender Diversity, 1400–1600: Renaissance Art Out of the Canon.** Studies the rising status of painting, sculpture, and architecture in Europe and how Europeans perceived non-Western art during the early modern period. Introduces history of race/ethnicity, gender, and class concerns embodied in the European category visual arts. Emphasizes new methods for interpreting history without imposing Eurocentric viewpoints. Prereqs., ARTH 1300 and 1400. Approved for arts and sciences core curriculum: human diversity.

**ARTH 3309-3. European Art, 1300–1800.** Covers high visual culture in Europe from 1300 to 1800. Discussions of this concept with its implications for aesthetics, semiotics, and ideology form the core of the course. Prereqs., ARTH 1300 and 1400. Similar to FINE 1209.

**ARTH 3419-3. Modern Art Survey.** Surveys the loss of beauty in art and discusses whether or not that loss is regrettable. Questions the function and historical meaning of modern and postmodern art: is it all hype and strategic positioning by artists for fame and fortune? Is it serious? Are the fine arts still fine? Prereq., ARTH 1300, 1400.

**ARTH 3509-3. American Art.** Surveys American art and material culture from the precolonial era to the present day. Considers cultural and artistic interaction, ethnic expressions, patronage, European and non-Western influences, and the struggle to develop a uniquely American artistic identity. Prereqs., ARTH 1300 and 1400. Approved for arts and sciences core curriculum: United States context.

**ARTH 3519-3. Modern Architecture, 1780–1960.** Introduces the major movements and developments in European and American architecture from Neoclassicism to Postmodernism. Considers the impact of exhibitions, expositions, and vernacular architecture. Prereqs., ARTH 1300, 1400.

**ARTH 3619-3. The Arts of China.** Surveys Chinese painting, sculpture, architecture, and other arts from neolithic to modern times. Prereqs., ARTH 1300, or 1400, or 2409, or HIST 1608.

**ARTH 3629-3. The Arts of Japan.** Offers an appreciation and chronological development of the arts of Japan. Emphasizes the arts of Shintoism and

Buddhism as well as the particular Japanese aesthetic from prehistoric times to the present. Prereq., one 3000-level art history course.

**ARTH 3719-3. History of Media Arts.** Surveys the development of technological media both as sources of information and as art. Photography and related media, film, video, holography, and electronic imaging systems are surveyed as art and as technologies, emphasizing major artists, movements, exhibitions, and other productions in the 19th and 20th centuries. Prereqs., ARTH 1300 and 1400.

**ARTH 3929 (1-3). Special Topics in Art History.** May be repeated up to 18 total credit hours when topic varies. Prereqs., ARTH 1300 and 1400.

**ARTH 4019-3. Art of Ancient Egypt.** Surveys the development of Egyptian architecture, sculpture, painting, and the minor arts from their beginnings to the establishment of Christianity. Prereq., one 3000-level art history course. Same as ARTH 5019.

**ARTH 4039-3. Byzantine Art.** Examines art of the East Christian Empire from the accession of Constantine to the conquest of Constantinople with a synopsis of developments from 1453 through the 18th century. Prereq., one 3000-level art history course. Same as ARTH 5039.

**ARTH 4069-3. Medieval Manuscripts.** Surveys decorated books from late antiquity to the advent of the printing press. Examines the various roles manuscripts played within different medieval communities. Prereq., ARTH 1300 and 1400. Same as ARTH 5069.

**ARTH 4089-3. Romanesque and Gothic Art.** Examines major artistic trends in Europe between the years 1000 and 1300, a period that witnessed, among others, the development of gothic cathedrals and the rise of the professional artist. Particular attention will be given to exchange with other cultures. Prereqs., ARTH 1300 and 1400.

**ARTH 4109-3. Ancient Italian Painting.** Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania, and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended. Recommended prereqs., CLAS/ARTH 1509, 3049. Same as ARTH 5109 and CLAS 4109.

**ARTH 4119-3. Roman Sculpture.** Examines ancient Roman sculpture with emphasis on the display, iconography, and production of private and public monuments in the Roman Empire. Explores sculpture as evidence for historical developments, societal and gender attitudes, and state ideologies in the ancient Roman world. Recommended prereqs., ARTH 1300, CLAS or FINE 1019. Same as ARTH 5119 and CLAS 4119.

**ARTH 4129-3. Aegean Art and Archaeology.** A detailed study of the cultures of prehistoric Greece, the Cycladic Islands, and Crete, their art and archaeology, and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states. Same as ANTH/ARTH 4129, CLAS 5129.

**ARTH 4139-3. Greek Vase Painting.** A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary, and written presentation. Same as CLAS 5139 and ARTH 5139.

**ARTH 4149-3. Greek Cities and Sanctuaries.** Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings, and using texts as well as material culture. Emphasis is on developing analytical skills. Same as ARTH 5149 and CLAS 4149. Formerly FINE 4149.

**ARTH 4169-3. Topics in Ancient and Classical Art and Archaeology.** In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary; they may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology. May be repeated up to 9 total credit hours providing the topics are different. Same as ARTH 5169 and CLAS 4169.

**ARTH 4189-3. Medieval Art.** Focuses on one area of medieval art. Topics vary, but may include Carolingian, Ottonian, Romanesque, or Gothic art. Emphasizes critical thinking, methods of scholarly research, and development of writing skills. Prereqs., ARTH 1300 and 1400.

**ARTH 4199-3. Roman Architecture.** Examines the designs, functions, and construction methods of ancient Roman towns, temples, baths, houses, and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation. Same as ARTH 5199 and CLAS 4199.

**ARTH 4209-3. Classical Archaeological Field Methods.** Offers experiential learning in theories and methods of field excavation at the Villa of Maxentius in Rome. Applies methods for stratigraphic excavation, electronic surveying with GIS, ceramic analysis, numismatic analysis, architectural construction materials and methods, artifact conservation and data processing and documentation. Offered abroad only. May be repeated up to 6 total credit hours. Coreq., ARTH 4219 for first 3 credit hours. Recommended prereqs., CLAS/ARTH 1509, 3049. Same as CLAS 4209 and 5209.

**ARTH 4219-3. Maxentius and the City of Rome.** Combines seminar discussion and site visits in Rome and Tivoli to understand the excavations at the Villa of Maxentius and its artifacts in the broader contexts of Roman architectural development, late Roman art, and late imperial Roman history. Offered abroad only. Must be taken concurrently with CLAS/ARTH 4209 or CLAS 5209. Recommended prereqs., CLAS/ARTH 1509, 3049. Same as CLAS 4219.

**ARTH 4269-3. Art and Archaeology of the Ancient Near East.** Examines civilizations of the Iran-Iraq region from the rise of urbanism in Mesopotamia through the era of the first "world empire," Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of kingship. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, and roles of artists. Recommended prereq., CLAS/ARTH 1509. Same as ARTH 5269 and CLAS 4269. Approved for arts and sciences core curriculum: human diversity.

**ARTH 4279-3. Michelangelo (1475–1564).** Focuses on Michelangelo's long career, marked by outstanding achievements in sculpture, painting, architecture, and poetry. Emphasizes his projects and achievements in light of 16th century artistic theory, including relationships to his contemporaries in the arts and literature. Prereq., one 3000-level art history course. Same as ARTH 5279.

**ARTH 4309-3. Neoclassicism and Romanticism: 1760–1840.** Surveys painting and sculpture in England and France from the last quarter of the 18th century through the first half of the 19th century. Prereq., one 3000-level art history course. Same as ARTH 5309.

**ARTH 4319-3. European Art from 1830 to 1886.** Surveys the major movements in painting in France and England from the Revolution of 1830 to the impressionist crisis of 1886. Emphasizes and discusses painting and major expressions in sculpture and architecture. Same as ARTH 5319.

**ARTH 4329-3. Modern Art 1.** Provides an in-depth study of the fin de siècle, stressing postimpressionism, art nouveau, and symbolism. Concludes with fauvism in France and the expressionist movement in Germany. Prereq., one 3000-level art history course. Same as ARTH 5329. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 4339-3. Modern Art 2.** Begins with early Picasso and cubism, including analytic and synthetic cubism and emphasizing the various isms of the 20th century. Also studies Italian futurism, de Stijl and the Bauhaus, dada, and surrealism. Prereq., one 3000-level art history course. Same as ARTH 5339.

**ARTH 4359-3. Modern Sculpture, 1870–1970.** Examines outstanding sculptors in Europe and America from Rodin to the present. Emphasizes American sculpture since World War II. Prereq., one 3000-level art history course. Same as ARTH 5359.

**ARTH 4409-3. Arts of Africa and Oceania.** Covers native arts of non-Western peoples of Africa and Oceania, including sculpture, architecture, and minor arts for both archaeological and ethnological cultures. Emphasizes the function of art in society as well as aesthetic analysis. Prereq., one 3000-level art history course. Same as ARTH 5409.

**ARTH 4429-3. Latin American Art since 1492.** Surveys arts of the colonies of Spain and Portugal in the Western Hemisphere from 1492 to the present. Prereq., one 3000-level art history course. Same as ARTH 5429. Formerly FINE 4429.

**ARTH 4439-3. Native North American Art.** Surveys art of North American Indian cultures, including the northwest coast, southwest, southeast, north-east, and plains, covering architecture, sculpture, and minor arts for both archaeological and ethnological cultures. Prereq., one 3000-level art history course. Same as ARTH 5439.

**ARTH 4449-3. Arts of India and Southeast Asia.** Surveys the architecture, sculpture, and painting of India and those areas of Southeast Asia influenced by India from the period of Mohenjo Daro and Harappa to recent times. Includes the Himalayan region and Tantric art in general. Prereq., one 3000-level art history course. Same as ARTH 5449.

**ARTH 4469-3. Chinese Painting.** Surveys the history of Chinese painting, with special emphasis on major masters and monuments, the history of styles, and Chinese theories on the art of painting. Focuses on Chinese painters, their lives, and art as representatives of China's artistic heritage. Prereq., one 3000-level art history course.

**ARTH 4489-3. History of Japanese Prints and Their Impact on Modern Art.** Surveys printmaking in Japan from its introduction to the present. Examines pre-Modern and Modern Japanese art and culture reflected in prints. Explores *ukiyo*, "the floating world," and its impact on modern artists in Europe and America. Prereq., one 3000-level art history course. Recommended prereq., ARTH 3629. Same as ARTH 5489.

**ARTH 4509-3. 19th Century American Art.** Examines American painting, sculpture, photography, folk, and popular art throughout the nation's beginnings through the 19th century, with particular attention to emergence of art styles, the development of art museums and academies, and cultural interaction with Europe. Prereq., one 3000-level art history course. Recommended prereq., ARTH 3509. Same as ARTH 5509.

**ARTH 4519-3. 20th Century American Art.** Traces the history of 20th century American art, focuses on painting, sculpture, and a variety of other media from the Gilded Age of the 1890s to the end of the century that came to be called the American Century. Especially focuses on the development of American styles and modes of modern art, and on the issues of cultural migration. Aims to demonstrate methods of visual analysis by which American art can be engaged in the discussion of historical problems and issues. Prereq., one 3000-level art history course. Same as ARTH 5519.

**ARTH 4529-3. American Art: 1945–1970.** Examines the triumph of American painting, sculpture, architecture, and other arts after World War II and through the 1960s. Considers mainstream art (abstract expressionism, pop, minimalism) and alternative art (earthworks, feminist and minority expression, visionary architecture, funk sculpture) in New York and California. Prereq., one 3000-level art history course. Same as ARTH 5529.

**ARTH 4539-3. Contemporary Art.** Examines contemporary art and theory in the transition from modern to postmodern expression. Discusses painting, sculpture, installations, performance, video, photography, and architecture with attention to historical context and criticism. Considers neoexpressionist, feminist, minority, political, and public art. Prereq., one 3000-level art history course. Same as ARTH 5539.

**ARTH 4549-3. Contemporary Public Art.** Focuses on the changing relationship of architecture, art and ornament, the role of the public, and the function and patronage of contemporary public art. Considers environmental art, community murals, activist art, temporary installations, issues of censorship, and monuments and memorials. Prereq., one 3000-level art history course. Same as ARTH 5549.

**ARTH 4559-3. Twentieth-Century Architecture.** Examines the major movements and development in European and American architecture, 1900–1960's. Considers the major styles, as well as cultural interactions, race/ethnicity, gender and class concerns as they relate to both the practice and profession of architecture. Prereqs., ARTH 1300, 1400.

**ARTH 4569-3. United States Architecture.** Examines architecture as it developed in the area now defined as the continental United States from early cultures to the present. Considers the major styles and issues of cultural interac-

tion, race/ethnicity, gender and class concerns as they relate to the practice, theory, and profession of architecture. Prereq., ARTH 1300 and 1400.

**ARTH 4739-3. The Intellectual Roots of Italian Renaissance Art.** Studies critical issues raised in the literature on art, focusing on Renaissance interpretations of key historical themes such as imitation and decorum. Carefully examines the language used in primary sources (available in English). Prereq., one 3000-level art history course.

**ARTH 4749-3. Italian Renaissance Art: Studies in the Exchange between Theory and Practice.** Addresses how artists developed new compositional procedures, graphic techniques, and audiences, and how these procedures were theorized in an age when artists' intellectual and social status rose dramatically. Explores reception of new graphic technology. Studies specific commissions and primary texts in depth. Prereq., one 3000-level art history course. Same as ARTH 5749.

**ARTH 4759-3. 17th Century Art and the Concept of the Baroque.** Surveys 17th century European painting, sculpture, and architecture, along with a critical study of artistic theory, artistic institutions (such as the Academia di San Luca and the Academie Royal), and the concept of the term baroque. Prereq., one 3000-level art history course. Same as ARTH 5759. Approved for arts and sciences core curriculum: literature and the arts.

**ARTH 4769-3. Gender Studies in Early Modern Visual Culture.** Examines 15th and 16th century European ideas about women from a variety of feminist perspectives. Focuses on recent contributions to history of women as they intersect with the visual arts. Prereq., one 3000-level art history course. Same as ARTH 5769 and WMST 4769. Approved for arts and sciences core curriculum: human diversity.

**ARTH 4779-3. Multicultural Perspectives on New Mexican Santos.** Reflects upon the question: In what sense were the regional variants of European devotional images the effects of meaningful cultural interaction? Evidence considered includes oral traditions, pueblo pottery, and painting, emphasizing interpretations that respect rights of communities to maintain privacy. Prereqs., ARTH 1300, 1400, and one 3000-level art history course. Same as ARTH 5779.

**ARTH 4819-3. Contemporary Chicano Art.** Examines Chicano artworld, focusing on contemporary scene. Lecture/discussion/dialogue explored through readings and visual presentations including: video, guest lecturers, and visits to local spaces. Prereq., any 3000-level art history course or instructor consent.

**ARTH 4909 (1-3). Independent Study: Art History.** May be repeated up to 7 total credit hours.

**ARTH 4919-3. Undergraduate Seminar: Selected Topics in Art History.** Seminar course dealing with selected areas or problems within the history of art. Consult current online Schedule Planner for seminar topic. May be repeated up to 7 total credit hours. Prereq., instructor consent.

**ARTH 4929 (1-3). Special Topics in Art History.** May be repeated up to 18 total credit hours when topic varies. Same as ARTH 5929.

**ARTH 4939 (3-6). Art Museum Internship.** Focuses on opportunities at the Denver Art Museum, working with individual curators and master teachers in selected areas, such as audience interpretation, interpretive research files, and public school curriculums. Introduces students to the professional culture and activities of art museums. May be repeated up to 6 total credit hours. Prereqs., ARTH 1300 and 1400. Same as ARTH 5939.

**ARTH 4959-3. Art History Honors Thesis.** May be elected during the final semester. Consists of a substantial, original written thesis. Requires faculty sponsorship. Does not guarantee a student will receive honors. Same as FINE 4008.

**ARTH 5019-3. Art of Ancient Egypt.** Same as ARTH 4019.

**ARTH 5039-3. Byzantine Art.** Same as ARTH 4039.

**ARTH 5069-3. Medieval Manuscripts.** Same as ARTH 4069.

**ARTH 5109-3. Ancient Italian Painting.** Same as ARTH 4109 and CLAS 5109.

**ARTH 5119-3. Roman Sculpture.** Same as ARTH 4119 and CLAS 5119.

**ARTH 5129-3. Aegean Art and Archaeology.** Same as ARTH 4129.

**ARTH 5139-3. Greek Vase Painting.** Same as ARTH 4139 and CLAS 5139.



**ARTH 5149-3. Greek Cities and Sanctuaries.** Same as ARTH 4149 and CLAS 5149.

**ARTH 5159-3. Hellenistic Art and Archaeology.** Examines art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.E.) to the conquest of Greece by the Romans (middle second century B.C.E.). Same as CLAS 5159.

**ARTH 5169-3. Topics in Ancient and Classical Art and Archaeology.** Same as ARTH 4169 and CLAS 5169.

**ARTH 5179-3. Periklean Athens.** Explores in detail the buildings, sculptures, pots, and foreign imports of Athens under the leadership of Perikles, considering material culture of individuals as much as civic programs. Emphasis is on ways in which the textual and archaeological evidence complement and/or contradict one another. Same as CLAS 5179.

**ARTH 5189-3. Augustan Rome.** Explores the sculptures, paintings, and buildings constructed in Rome during the reign of the first emperor Augustus (27 B.C.E.–14 C.E.). Examines the monuments of Augustan Rome as both dependent on republican precedents and yet innovative with respect to designs and meanings. Same as CLAS 5189.

**ARTH 5199-3. Roman Architecture.** Same as ARTH 4199 and CLAS 5199.

**ARTH 5269-3. Art and Archaeology of the Ancient Near East.** Same as ARTH 4269/CLAS 5269.

**ARTH 5279-3. Michelangelo (1475–1564).** Same as ARTH 4279.

**ARTH 5309-3. Neoclassicism and Romanticism: 1760–1840.** Same as ARTH 4309.

**ARTH 5319-3. European Art from 1830 to 1886.** Same as ARTH 4319.

**ARTH 5329-3. Modern Art 1.** Same as ARTH 4329.

**ARTH 5339-3. Modern Art 2.** Same as ARTH 4339.

**ARTH 5359-3. Modern Sculpture 1870–1970.** Same as ARTH 4359.

**ARTH 5409-3. Arts of Africa and Oceania.** Same as ARTH 4409.

**ARTH 5429-3. Latin American Art since 1492.** Same as ARTH 4429.

**ARTH 5439-3. Native North American Art.** Same as ARTH 4439.

**ARTH 5449-3. Arts of India and Southeast Asia.** Same as ARTH 4449.

**ARTH 5489-3. History of Japanese Prints and Their Impact on Modern Art.** Same as ARTH 4489.

**ARTH 5499-6. Arts of Vietnam in Context.** Same as ARTH 4499.

**ARTH 5509-3. 19th Century American Art.** Same as ARTH 4509.

**ARTH 5519-3. 20th Century American Art.** Same as ARTH 4519.

**ARTH 5529-3. American Art 1945–1970.** Same as ARTH 4529.

**ARTH 5539-3. Contemporary Art.** Same as ARTH 4539.

**ARTH 5549-3. Contemporary Public Art.** Prereq., grad standing. Same as ARTH 4549.

**ARTH 5749-3. Italian Renaissance Art: Studies in the Exchange between Theory and Practice.** Same as ARTH 4749.

**ARTH 5759-3. 17th Century Art and the Concept of the Baroque.** Same as ARTH 4759.

**ARTH 5769-3. Gender Studies in Early Modern Visual Culture.** Same as ARTH/WMST 4769.

**ARTH 5779-3. Multicultural Perspectives on New Mexican Santos.** Same as ARTH 4779.

**ARTH 5909 (1-3). Graduate Independent Study: Art History.** May be repeated up to 9 total credit hours.

**ARTH 5929 (1-3). Special Topics in Art History.** May be repeated up to 18 total credit hours. Same as ARTH 4929.

**ARTH 5939 (3-6). Art Museum Internship.** May be repeated up to 6 total credit hours. Same as ARTH 4939.

**ARTH 6150-3. Critical and Theoretical Issues in Museums.** Investigates key problems facing museum institutions and studies the staging and representa-

tion of historical knowledge, the ethics of collecting and display, the changing nature and uses of historical evidence, and relations between curatorial practice, collecting, and field work. Critically examines different approaches to museums and museology in various disciplines, both past and present. Prereq., MUSM 5011 or instructor consent. Same as MUSM 6150, HIST 6150, and ANTH 6150.

**ARTH 6929-3. Seminar: Theories of Art History.** Provides a systematic critical overview of the development of art history as a discipline beginning with 18th century theories of aesthetics and ending with current interdisciplinary models of critical interpretation. Weekly readings, discussions, reports, and written papers constitute the format of this seminar in methodology. Topics vary from semester to semester. May be repeated up to 6 total credit hours within a term. Required for MA (art history) students.

**ARTH 6939-3. Graduate Seminar: Open Topics in Art History.** Subjects and topics vary. May be repeated up to 9 total credit hours. Prereq., graduate standing.

**ARTH 6949 (1-3). Master's Candidate for Degree.**

**ARTH 6959 (1-6). Master's Thesis (Art History).**

**ARTH 6969 (1-6). Master's Project (Art History).**

## Arts and Sciences

### Writing

**ARSC 1000 (3-4). Expository Writing.** Develops college-level reading, writing, and thinking. Students are asked to read critically, then construct written responses that are revised and crafted into more formal essays and position papers. Offered through the Student Academic Services Center. Prereq., program coordinator consent required.

**ARSC 1080-4. College Writing and Research.** Introduces academic and professional genres through the research and inquiry process. Students practice close reading, oral presentation, drafting, synthesis, analysis and research skills in discussion, writing workshops, and one-on-one conferences. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**ARSC 1081-1. SASC Coseminar: College Writing and Research.** One-credit seminar provides extended instruction in written composition for students enrolled in ARSC 1080. Graded assignments enrich students' understanding of genre, organization, research skills, and grammar. Coreq., ARSC 1080.

**ARSC 1150-3. Writing in Arts and Sciences.** Emphasizes the development of effective writing skills with instruction provided in expository and analytical writing. Reviews basic elements of grammar, syntax, and composition as needed. Meets MAPS requirement for English. May be repeated up to 6 total credit hours. Approved for arts and sciences core curriculum: written communication.

**ARSC 3100-3. Multicultural Perspective and Academic Discourse.** Teaches students how to write academic papers related to race, class, gender, sexuality, and other areas of cultural identity. Students acquire expertise on issues through readings, guided discussion, and research and practice oral presentation skills, drafting, and workshopping of papers. Prereq., lower level writing course(s) or waiver. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: written communication.

### Miramontes Arts and Sciences Program (MASP)

**ARSC 1400-1. MASP Coseminar: CHEM 1 and 2.** Supplements and strengthens student experiences in chemistry. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1420-1. MASP Coseminar: Introduction to EEB.** Designed to supplement and strengthen student experiences in EBIO 1210 and 1220. Allows particularly gifted students an opportunity to extend their understanding of the subject and possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1432-1. MASP Coseminar: Economics.** Designed to supplement and strengthen student experiences in microeconomics. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in social science. May be repeated up to 2 total credit hours.

**ARSC 1440-1. MASP Coseminar: Mathematics.** Offers an unusual and essential opportunity for students to receive small-group enrichment and reinforcement. Supplements and strengthens student experiences in mathematics, allowing particularly gifted students an opportunity to extend their understanding of the subject in a supportive environment, and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1460-1. MASP Coseminar: Introduction to MCD Biology.** Supplements and strengthens student experiences in MCDB 1150 and 2150. Allows particularly gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 1480-1. MASP Seminar: Exploration of Public Discourse through the Social Sciences.** Fosters an appreciation of the humanities and social sciences. Readings, discussions, cooperative learning exercises, and outside activities illustrate the interconnections between different bodies of knowledge. Emphasizes relationships between the humanities/social sciences and the real world. May be repeated up to 2 total credit hours.

**ARSC 1490-1. MASP Seminar: Activating the Humanities and Social Sciences.** Building on ARSC 1480, enhances students' knowledge and appreciation of the humanities and social sciences. Readings, discussions, cooperative learning exercises, workshoping papers and presentation, guest speakers, and outside activities are designed to enhance both students' appreciation of the subject matter and their performance in their regular courses. Emphasis is on actively using knowledge of humanities and social sciences in a variety of ways. Prereq., ARSC 1480. May be repeated up to 2 total credit hours.

**ARSC 1492 (1-3). MASP Research Seminar.** Building on ARSC 1490, this course seeks to enhance students' knowledge and appreciation of the humanities and social sciences. Readings, discussions, cooperative learning exercises, workshoping papers and presentations, guest speakers, and outside activities are designed to enhance both students' appreciation of the subject matter and their performance in their regular courses. Emphasis is placed on actively using knowledge of humanities and social science in a variety of ways. May be repeated up to 6 total credit hours.

**ARSC 2400-1. MASP Coseminar: Organic Chemistry.** Supplements and strengthens student experiences in organic chemistry. Allows gifted students an opportunity to extend their understanding of the subject and to explore possible careers in science. May be repeated up to 2 total credit hours.

**ARSC 2470-1. MASP Coseminar: Physics 1 and 2.** Supplements and strengthens student experiences in physics. Allows particularly gifted students an opportunity to extend their understanding of the subjects and to explore possible careers in science. May be repeated up to 2 total credit hours.

## Special Curricula

**ARSC 1200 (1-3). Topics in Arts and Sciences.**

**ARSC 1600-1. The University of Colorado Experience.** Provides an effective transition to the university by giving students a solid base for developing scholarship, citizenship, decision making, and involvement in their university community. Topics include academic and campus resources, safety, health, and diversity.

**ARSC 1710-1. Calculus Bridge Course.** Provides motivated pre-calculus students with more in-depth and more challenging coverage of material assumed in calculus. Students complete advanced problems that cannot be covered in pre-calculus courses due to time constraints. Mastery of material is emphasized. Prereq., proficiency in high school mathematics. Coreq., MATH 1001/1021.

**ARSC 1720-1. SASC Coseminar: Calculus Work Group.** This 1-credit seminar provides motivated calculus students with more in-depth and more challenging coverage of material assumed in calculus. Students complete advanced problems that cannot be covered in calculus courses due to time constraints.

Mastery of material is emphasized. Prereq., proficiency in pre-calculus mathematics. Recommended prereq., A/B average in pre-calculus sequence. Coreq., MATH 1300.

**ARSC 1800-3. Methods of Inquiry.** Introduces students to methodologies used in different academic disciplines, e.g., how a paleographer dates a manuscript. Course is team-taught. Students must also enroll in two of four co-requisite course sections, all in different areas of the core curriculum. The co-requisite course sections are listed in the online Schedule Planner.

**ARSC 2000-3. Ways of Knowing: Constructions of Knowledge in the Academy and Beyond.** Explores different ways of knowing from interdisciplinary, cross-cultural perspectives. Course begins with personal interrogations of students' primary learning modes. It goes on to examine cultural assumptions about schooling, learning and knowledge, juxtaposing western and eastern philosophies of knowing and looking at how gender, race, class, and other categories of identity shape and interpret concepts of knowledge. Same as NRLN 2000. Approved for arts and sciences core curriculum: ideals and values.

**ARSC 2110-4. Physical Science of the Earth System.** Covers basic concepts of physics and chemistry, taught in the context of Earth and space science. Small class size and emphasis on student investigations, labs and field work, and active learning make this course particularly appropriate for future K-6 teachers. Prereq., two high school science courses (college prep level). Same as GEOL 2110. Approved for arts and sciences core curriculum: natural science.

**ARSC 2274-3. Peer Counseling.** Introduction to basic peer education and counseling theory and techniques. Students learn experientially by practicing a variety of skills in an informal atmosphere. The material learned is valuable to students professionally (as employee or supervisor in any field or as helping professional) regardless of career path. Students increase self-awareness and apply it to their own lives. Restricted to sophomores/juniors/seniors. Offered Fall semesters only.

**ARSC 3600-4. Diversity Issues: Higher Education.** Uses Internet dialogue, computing, and media technology to improve communication and develop research and inquiry skills and critical thinking. Race, class, gender, and sexual orientation issues are addressed to foster understanding of university codes of inquiry and modes of interaction in scholarly communities. Prereq., admission to McNair Program, junior standing, minimum GPA of 2.50, and strong interest in graduate school).

**ARSC 3650-3. Diversity Issues in Graduate Education.** Guides students through research on diversity and retention issues in graduate education. Participants use Tinto's work on academic and social integration as a conceptual framework. Further, students investigate how specific institutions support diversity goals in their graduate programs. Prereq., admission to McNair program (minimum 2.50 GPA, three recommendation letters, personal statement, strong interest in graduate school).

**ARSC 3700 (1-5). McNair Seminar: Research Design.** Multidisciplinary course guiding critical thinking as students design a formal investigation. Includes presenting and writing a prospectus. Students revise the prospectus, creating a proposal for funding the research as well as HRC proposals. May be repeated up to 6 total credit hours. Prereq., admission to McNair Program (junior standing, minimum GPA of 2.50, and a strong interest in graduate school).

**ARSC 3935 (1-6). Internship.** May be repeated up to 6 total credit hours.

**ARSC 4000-3. Multimedia Applications in Foreign/Second Language Education.** Focuses on knowledge and skills in accessing, evaluating, and integrating technology-assisted, mediated material in the teaching and learning of foreign languages. Also focuses on hands-on design and production of instructional software for foreign languages. Recommended prereq., a language-teaching methodology course. Same as ARSC 5000.

**ARSC 4040 (1-3). Arts and Sciences Special Topics.** Same as ARSC 5040.

**ARSC 4700 (1-5). The McNair Seminar: Research Practices and Procedures.** Within the range of scholarly modes, student researchers examine discipline-specific rationales for evidence and analysis. Lecturers distinguish popular concepts of investigation from scholarly research. Students learn to take great care describing and discussing methods, findings, interpretations, assertions, and conclusions. May be repeated up to 10 total credit hours. Pre-

req., admission to McNair Program (junior standing, meeting TRIO guidelines, strong interest in graduate school).

**ARSC 4909 (2-6). Senior Thesis for Individually Structured Major.** May be repeated up to 6 total credit hours.

**ARSC 4910-1. McNair Practicum: Principles and Practices of University Teaching.** Teaches the core principles of pedagogy at the university level and provides students guidance and feedback on constructing a teaching session in collaboration with a faculty mentor. Using the instructional practices of their discipline, students discuss issues university faculty encounter in their quest toward teaching excellence. The expertise of the Graduate Teacher Program, the Preparing Future Faculty Network and the Faculty Teaching Excellence Program will be drawn upon for supplemental resources, seminars and workshops. May be repeated up to 3 total credit hours. Prereq., ARSC 4700. Restricted to McNair Program Students.

## Graduate-Level Courses

**ARSC 5000-3. Multimedia Applications in Foreign/Second Language Education.** Same as ARSC 4000.

**ARSC 5040 (1-3). Arts and Sciences Special Topics.** Same as ARSC 4040.

**ARSC 5050-3. Graduate Seminar on Applied Behavior Science 1.** The first part of a two-semester sequence designed to introduce graduate students in the social sciences to interdisciplinary theory, concepts, and methods as applied to important social problems. Prereq., completion of first year of graduate work in a social science department.

**ARSC 5060-3. Graduate Seminar on Applied Behavior Science 2.** The second part of a two-semester sequence designed to introduce graduate students in the social sciences to interdisciplinary theory, concepts, and methods as applied to important social problems. Prereq., ARSC 5050.

**ARSC 5200 (1-3). Advanced Directed Readings in Ethnic Studies.** This is a graduate level directed readings course designed to expand student knowledge in a particular area of concentration with a broad interdisciplinary and comparative framework. These areas of concentration include work in Africana, American Indian, Asian American, Chicana and Chicano and Transnational/Hemispheric ethnic studies. Restricted to graduate students in good academic standing.

## Asian Languages and Civilizations

**EALC 4911-3. Practicum in Asian Languages 1.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5911.

**EALC 4912-3. Practicum in Asian Languages 2.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5912.

**EALC 4913-3. Practicum in Asian Languages 3.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5913.

**EALC 4914-3. Practicum in Asian Languages 4.** Introduces elementary or intermediate Chinese or Japanese language and culture and East Asian language pedagogy. Designed for students in TESEAL track (Teaching English to Speakers of East Asian Languages) through EALC or linguistics; open to others by permission. Courses must be taken in sequence. Prereq., department approval. Same as EALC 5914.

**EALC 4930 (1-6). Internship.** Selected students are matched with supervised internships in business, public and private service organizations, and educational institutions. Internships focus on opportunities to apply language and cultural skills. Students meet regularly with instructor and supervisor, keep a journal, and submit a final paper. May be repeated up to 6 total credit hours. Prereq., JPNS 2120 or CHIN 2120. Recommended prereq., JPNS 3120 or CHIN 3120.

**EALC 5911-3. Practicum in Asian Languages 1.** Prereq., department approval. Same as EALC 4911.

**EALC 5912-3. Practicum in Asian Languages 2.** Prereq., department approval. Same as EALC 4912.

**EALC 5913-3. Practicum in Asian Languages 3.** Prereq., department approval. Same as EALC 4913.

**EALC 5914-3. Practicum in Asian Languages 4.** Prereq., department approval. Same as EALC 4914.

**EALC 5950-1. Perspectives on East Asian Languages.** Reads and discusses issues in contrastive linguistics, cultural differences, linguistic analysis, and methodological issues related to the teaching of English to speakers of East Asian languages. May be repeated up to 6 total credit hours.

## Arabic

**ARAB 1010-5. Beginning Arabic 1.** Introduces students to speaking, listening, reading, and writing skills in the standard means of communication in the Arab world. This course is proficiency-based. All activities within the course are aimed at placing the student in the context of the native-speaking environment from the very beginning.

**ARAB 1020-5. Beginning Arabic 2.** Continuation of ARAB 1010. Prereq., ARAB 1010 (min. grade C) or placement.

**ARAB 2110-3. Intermediate Arabic 1.** Proficiency-based course emphasizes speaking, listening, reading, and writing. Covers a variety of topics. Students give classroom presentations and write short essays in Arabic. Speaking ability is assessed through an oral proficiency interview. Prereq., ARAB 1020 (min. grade C), or placement. Meets MAPS requirement for foreign language.

**ARAB 2120-3. Second Year Arabic 2.** Continuation of ARAB 2110. Prereq., ARAB 2110 (min. grade C) or placement.

**ARAB 3010-3. Advanced Arabic I.** Designed to train students further in the four language skills (writing, speaking, reading, listening/comprehension) at an advanced level. Enables students to acquire a better and broader understanding of Arabic culture and texts drawn from various genres of Arabic letters. Prereq., ARAB 2120 (min. grade C).

**ARAB 3020-3. Advanced Arabic II: Issues in Arabic Language and Culture for Business.** Aimed at students who have already completed five semesters of Arabic. Assumes that students already have complete control of basic intermediate grammar, structure and syntax, and descriptive/narrative concrete vocabulary. Draws on several sources from the Arabic/Islamic business society and from Arabic culture and letters as well as Arab press. Taught in Arabic, but many of the assignments and readings will be in both English and Arabic. Prereq., ARAB 3010.

**ARAB 3230-3. Islamic Culture and the Iberian Peninsula.** Examines Islamic, especially Arab, culture and history as it relates to the Iberian Peninsula from 92 A.H./711 C.E. to the present. Taught in English. Approved for arts and sciences core curriculum: historical context.

**ARAB 4840 (1-3.) Independent Study.** Departmental approval required. May be repeated up to 7 total credit hours.

## Chinese

**CHIN 1010-5. Beginning Chinese 1.** Introduces modern Chinese (Mandarin), emphasizing speaking as well as reading and writing. Students learn both traditional full-form characters and the simplified versions used in mainland China. Credit not granted for this course and CHIN 1150.

**CHIN 1020-5. Beginning Chinese 2.** Continuation of CHIN 1010. Prereq., CHIN 1010 (min. grade C) or instructor consent. Credit not granted for this course and CHIN 1150.

**CHIN 1150-5. Intensive First-Year Chinese.** Intensive beginning course covers the same materials as CHIN 1010 and CHIN 1020. Prereqs., instructor consent and placement test (min. grade C). Restricted to students with Chinese language background. Not open to students with credit in CHIN 1010 or CHIN 1020.

**CHIN 2110-5. Intermediate Chinese 1.** Emphasizes reading, speaking, and writing modern Chinese, including continued study of both full-form and simplified characters. Introduces dictionaries and principles of character formation. Prereq., CHIN 1020 (min. grade C) or instructor consent. Credit not granted for this course and CHIN 2150. Meets MAPS requirement: foreign language.

**CHIN 2120-5. Intermediate Chinese 2.** Continuation of CHIN 2110. Prereq., CHIN 2110 (min. grade C) or instructor consent. Credit not granted for this course and 2150.

**CHIN 3110-5. Advanced Chinese 1.** Surveys a variety of authentic-language materials, including films, plays, newspaper articles, essays, and short stories. Extensive use of videotapes made from actual television programs, news broadcasts, commercials, and documentaries. Emphasizes proficiency-oriented approach to reading, writing, and oral communication. Prereq., CHIN 2120 (min. grade C) or instructor consent.

**CHIN 3120-5. Advanced Chinese 2.** Continuation of CHIN 3110. Prereq., CHIN 3110 (min. grade C) or instructor consent.

**CHIN 4110-3. Advanced Readings in Modern Chinese 1.** Surveys a wide variety of 20th- and 21st-century written materials, including texts from literature, the social sciences, religion, and cultural history. Focuses on content and style with extensive discussion and frequent written assignments in Chinese. Conducted in Chinese. Prereq., CHIN 3120 (min. grade C) or instructor consent.

**CHIN 4120-3. Advanced Readings in Modern Chinese 2.** Continuation of CHIN 4110. Prereq., CHIN 4110 or instructor consent.

**CHIN 4210-4. Introduction to Classical Chinese.** Introduces the classical language based on texts from the pre-Han and Han periods. Stresses precise knowledge of grammatical principles and exactitude in translation—the basis for all further work in classical Chinese. Prereq., CHIN 2120 or instructor consent.

**CHIN 4220-4. Readings in Classical Chinese.** Close reading of selected texts of ancient and medieval literature. Readings in both prose and poetry. Emphasizes a disciplined, philological approach to the texts, with proper attention to diction, tone, and nuance. Prereq., CHIN 4210, or instructor consent.

**CHIN 4300-3. Open Topics: Readings in Chinese Literature.** Studies selected texts on a particular topic taught by regular or visiting faculty. Topics change each term. May be repeated up to 6 total credit hours. Prereq., junior standing or instructor consent.

**CHIN 4750-3. Daoism.** A detailed examination of the history and current state of Daoism, China's indigenous organized religion, focusing on its origins and development, ethical teachings, ritual activities, and world view. Topics include the relationship of Daoism to popular religion, the practice of alchemy and self-cultivation, beliefs concerning death and the afterlife, and the structure of the Daoist pantheon. Prereq., RLST 3800 or instructor consent. Restricted to CHIN majors. Same as CHIN 5750 and RLST 4750.

**CHIN 4900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**CHIN 5010-3. Sinological Methods.** Provides training in research methods for graduate work in Sinology. Regular exercises require students to use standard bibliographic sources and tools, such as *leishu*, *congshu*, specialized dictionaries, dynastic histories, geographical treatises, gazetteers, and private historiography. Prereq., CHIN 4220 or instructor consent.

**CHIN 5020-3. Methods of Teaching Chinese.** An overview of pedagogical theory and methods for the teaching of Chinese as a second language, including issues of presentation, interaction, and evaluation. Prereq., graduate standing or instructor consent.

**CHIN 5030-3. Readings in Pre-Modern Chinese Literary Theory.** Introduces the field of pre-modern Chinese literary theory and its relevance in Chinese intellectual history. Based on the close reading of primary sources, i.e. typically on selected core texts of Chinese literary thought, as well as on the

reading of secondary literature. Texts and topics vary from year to year. Prereq., graduate standing or instructor consent. May be repeated up to 6 total credit hours.

**CHIN 5040-3. History of the Chinese Language.** An overview of the development of the Chinese language over the last 3,000 years, focusing on the diachronic changes in phonology and syntax, the evolution of the major dialect families, the standardization of the writing system, the creation of a common literary language, and the development of a standard written vernacular. Prereq., CHIN 4210 or instructor consent.

**CHIN 5060-3. Topics in Chinese Linguistics.** Examines topics in Chinese dialectology, discourse analysis, historical linguistics, phonetics, and syntax (both synchronically and diachronically). Topics vary from year to year. May be repeated three times for credit. Prereq., CHIN 4120 or equivalent.

**CHIN 5110-3. History of Sinology.** Surveys the history of Sinology from its formation as a self-conscious scholarly discipline to today. Focuses on significant works and contributions of the field's greatest practitioners. Prereq., graduate standing or instructor consent.

**CHIN 5120-3. History of Literature through the Ninth Century.** Surveys, with readings in primary and secondary sources, major landmarks in various areas of ancient and medieval literature. Focuses on the classic and most influential works of the Zhou through Tang dynasties. Gives attention to matters of historical fact and actuality as well as to textual and interpretive history. Prereq., graduate standing or instructor consent.

**CHIN 5210-3. Ancient Prose.** Studies selected pre-imperial and Han prose texts important in their own time and for the influence they exercised on the later development of Chinese literary history. Focuses on works such as the *Lunyu*, *Mengzi*, *Zhuangzi*, *Huainanzi*, *Shiji*, *Hanshu*, and *Lunheng*. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5220-3. Ancient Poetry.** Studies selected pre-imperial and Han poetic works important in their own time and for the influence they exercised on the later development of Chinese literary history. Focuses on the *Shijing* and the *Chu ci*, as well as the *fu* and *shi* of Han writers. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5280-3. Topics in Ancient Literature.** Examines a specific problem or issue in ancient Chinese literature, e.g., early views of language's relationship to reality, or the commentary tradition and the emergence of allegorical and metaphysical approaches to interpreting texts. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5410-3. Medieval Prose.** Explores selected Six Dynasties and Tang prose works, emphasizing major writers and texts. Covers works written in both parallel prose and the *guwen* ("old-style") form. Individual writers include such figures as Wang Xizhi, Tao Qian, Li Hua, Han Yu, Liu Zongyuan, and Liu Yuxi. In addition, selected works from the anecdotal records are read. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5420-3. Medieval Poetry.** Studies selected works of Six Dynasties and Tang poetry. Studies major figures, prosodic and stylistic variations, and the culturally revealing relationship of poetry to the natural and supernatural world of medieval China. Focuses on poets such as Xie Lingyun, Tao Qian, Wang Wei, Li Bo, Du Fu, as well as important medieval anthologies of verse. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5430-3. Medieval Thought and Religion.** Studies selected works of Six Dynasties and Tang intellectual and religious inspiration, important in the development of the medieval Chinese world view and for their role in medieval Chinese literature. Focuses on fundamental texts of both literary and religious value from the Daoist and Buddhist canons, such as the *Huangting jing*, *Zhen gao*, *Miaofa lianhua jing*, and *Tan jing*. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5480-3. Topics in Medieval Literature.** Examines a specific problem or issue in medieval literature, e.g., the role of encyclopedias and anthologies

in literary training, or the place and forms of literary composition at the imperial court. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5610-3. Early Modern Prose.** Studies Song, Ming, and Qing prose texts selected for their inherent literary merit and for their significance in the Chinese literary tradition. Typically focuses on works by major authors such as Ouyang Xiu, Su Shi, and Yuan Hongdao. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5620-3. Early Modern Poetry.** Studies Song, Yuan, Ming, and Qing poetry. Stresses major figures, stylistic variations, various poetry schools, new directions in *shi* verse, and the rise and development of *ci*. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5630-3. Early Modern Fiction.** Explores selected vernacular and classical fiction of the Ming and Qing periods. Normally focuses on long novels such as *Xiyou ji*, *Sanguo yanyi*, *Shuihu zhuan*, *Jin Ping Mei*, as well as short stories by Feng Menglong and Ling Mengchu. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5680-3. Topics in Early Modern Literature.** Examines a specific problem or issue in early modern literature (e.g., the relationships among religion, folklore, and early fiction; the issue of genre and traditional fiction); the role of elite versus popular cultures in the composition of fiction; or the relationship of the state and censorship and the southern philosophical schools to the publication of fiction. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4220 or instructor consent.

**CHIN 5750-3. Daoism.** Restricted to graduate students. Same as CHIN 4750 and RLST 5750.

**CHIN 5810-3. Modern Literature.** Examines selected texts in various genres of Chinese literature from the May Fourth period (beginning 1917) to the establishment of the People's Republic of China (1949). Focuses on major and influential works produced in this fertile period of experimentation with Western, modernist types of literature. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4120 or instructor consent.

**CHIN 5820-3. Contemporary Literature.** Examines selected texts in various genres of Chinese literature from 1949 (the establishment of the People's Republic of China) to the present. Focuses on major works from the very different literary worlds of Taiwan and mainland China. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4120 or instructor consent.

**CHIN 5880-3. Topics in 20th Century Literature.** Examines a specific problem or issue in 20th century literature, e.g., feminist fiction in China, modernism in fiction and poetry, or the role of literary criticism in modern literature. Topics vary from year to year. May be repeated up to 6 total credit hours. Prereq., CHIN 4120 or instructor consent.

**CHIN 5900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**CHIN 6900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**CHIN 6940 (1-3). Master's Degree Candidate.**

**CHIN 6950 (1-6). Master's Thesis.**

### *Chinese Courses in English*

**CHIN 1051-3. Masterpieces of Chinese Literature in Translation.** Surveys Chinese thought and culture through careful reading and discussion of selected masterworks of Chinese literature in translation. Texts include significant works of poetry and fiction, and philosophical and historical writings from various eras. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 1061-3. Boudoirs, Books, Battlefields: Voices and Images of Chinese Women.** Explores narrative and visual representations of women throughout Chinese history. Emphasizes how modern values of freedom and equality have transformed women's lives and shaped their aspirations in the 20th

century. Course materials include memoirs, novels, ethnographies, documentaries, and feature films. No knowledge of Chinese is necessary. Approved for arts and sciences core curriculum: human diversity.

**CHIN 2441-3. Film and the Dynamics of Chinese Culture.** Through studying a group of Chinese films in light of modern Chinese history and literature, students examine a series of cultural dilemmas and issues in 20th century China and develop skills in analyzing literary and filmic texts. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 3311-3. The Dao and the World in Medieval China.** An interdisciplinary examination of Chinese culture from the third to the tenth centuries A.D., encompassing the intellectual and religious ferment of the Period of Division and the literary and artistic achievements of the glorious Tang dynasty. Studies personal aspects of the world inhabited and created by medieval Chinese civilization, particularly relations with Daoism, Buddhism, natural history, court politics, and celestial and imaginative realms. Taught in English. Recommended prereq., EALC 1011 or CHIN 1051.

**CHIN 3321-3. Culture and Literature of Ancient China.** Focuses on the religious, cultural, philosophical, and literary aspects of ancient Chinese civilization (1500 B.C.–A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English. Recommended prereq., EALC 1011 or CHIN 1051. Same as HUMN 3321.

**CHIN 3331-3. Culture and Literature of Late Imperial China.** The late imperial period was marked by growth of great metropolitan areas, expanded urban entertainments, and an extensive popular culture. This course focuses on the literature and artifacts of this urban culture as well as the hegemonic culture of the state and of traditional social codes and their literary manifestations. Also considers growing contacts with the West and the transition to the modern period. All readings are in English. Recommended prereq., EALC 1011 or CHIN 1051.

**CHIN 3341-3. Literature and Popular Culture in Modern China.** Surveys 20th century Chinese (including Taiwanese) literature and popular culture against the historical background of rebellion, revolution, and reform. Emphasizes close and critical reading skills and an understanding of how aesthetic texts reflect and critically engage with historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films, and scholarly articles. Recommended prereq., EALC 1011 or CHIN 1051. Same as HUMN 3341. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 3351-3. Reality and Dream in Traditional Chinese Fiction.** Explores how early Chinese fiction offers a means of synthesizing societal values, culture, and intellectual developments in pre-modern China. Special attention is given to the *Story of the Stone* (also known as *Dream of the Red Chamber*), the masterpiece novel of the Qing dynasty (1644–1911), as well as classical Chinese tales from the third to the tenth century and selected vernacular stories written in the Ming (1368–1644). Considers various approaches to literary analysis and interpretation. Taught in English. Prereq., junior standing or instructor consent. Approved for arts and sciences core curriculum: literature and the arts.

**CHIN 3361-3. Women and the Supernatural in Chinese Literature.** Explores the relationship between the worlds of women and the supernatural in Chinese literature, from ancient to modern times. Focuses on selected significant works of classical and vernacular fiction, religious texts, and poetry (read in translation). Studies the variety of ways in which the folklore of the feminine is shaped and recast in different verbal creations and in different periods. Taught in English. Prereq., junior standing or instructor consent.

**CHIN 3371-3. Topics in Chinese Film.** Offers in-depth, critical analysis of key issues in Chinese culture as represented in Chinese film. Focuses on various topics, such as specific directors, regions, representation of gender in Chinese film, historical periods, etc. Varies from year to year. Requires no knowledge of Chinese. May be repeated up to 6 total credit hours on different topics. Prereq., junior standing or instructor consent. Recommended prereq., CHIN 1051, 2441.

**CHIN 3441-3. Chinese Language and Society.** Deals with major linguistic characteristics of Chinese as a medium of communication. Discusses complex linguistic processing of social status and empathy relationships, for example,

with reference to the structure of Chinese society and political system. Requires no knowledge of Chinese. Prereq., junior standing or instructor consent.

**CHIN 3451-3. Language and Gender in China.** Explores the relationship between the Chinese language and gender differences in China. Familiarizes students with the theoretical framework and scholarship surrounding gender and the Chinese language. Provides students with tools for examining gender differences in various Chinese dialects. Taught in English. Prereq., CHIN 1020 or instructor consent.

## Farsi

**FRSI 1010-5. Beginning Farsi I.** Provides a grounding in basic Persian Farsi grammar. The morphological and phonological nuances of the language will be introduced, along with Persian culture. Basic conversation is reinforced on a daily basis with strong emphasis and reiteration upon the homework and covered grammar.

**FRSI 1020-5. Beginning Farsi II.** Continuation of FRSI 1010. Completes the presentation of basic structures of Farsi. Continued acquisition of vocabulary and practice of speaking, listening, reading, and writing. Class conducted largely in Farsi. The second half of the course will introduce authentic texts of Persian prose literature. Some poetry may be included. Prereq., FRSI 1010 (min. grade C) or instructor consent required.

**FRSI 2010-4. Intermediate Farsi I.** Provides an intensive introduction to cultural and literary texts of Iran, along with an introduction of the grammatical and rhetorical complexities of Persian prose and poetry. Students continue to develop speaking, listening, and writing skills through activities based on the readings. Prereq., FRSI 1020 (min. grade C) or instructor consent required. Meets MAPS requirement: foreign language. Approved for arts and sciences core curriculum: foreign language.

**FRSI 2020-4. Intermediate Farsi II.** Continuation of FRSI 2010. Incorporates more readings in Persian literature, both poetry and prose, and cultural readings. Students continue developing speaking, listening and writing skills based on the readings. Prereq., FRSI 2010 (min. grade C) or instructor consent required.

**FRSI 3010-3. Advanced Farsi I.** This course will serve as an intensive introduction to both Persian philology and the contemporary novel. Textual analysis of texts ranging from complex to very complex will enable the students to gain a strong grounding in Persian literary texts. Students continue developing speaking, listening, and writing skills through activities based on the readings. Prereq., FRSI 2020.

**FRSI 3020-3. Advanced Farsi II.** This course is the continuation of FRSI 3010. The focus will be on textual analysis and discussion of authentic texts in a wide variety of genres and a wide range of topics. Students continue developing speaking and listening skills through activities based on the readings and develop the ability to write short papers (3–5 pages) in Farsi. Prereq., FRSI 3010.

## Hindi

**HIND 1010-5. Beginning Hindi 1.** Provides a thorough introduction to the modern Hindi language, emphasizing speaking, listening, reading, and writing skills. This course is proficiency-based. Activities aim to place the student in the context of the native-speaking environment from the very beginning. Students will be provided with opportunities to participate in local South Asian cultural events. Credit not granted for this course and ASIA 1420. Formerly HNDI 1010.

**HIND 1011-3. Introduction to Indian Civilization.** Survey of traditional and modern world views and experiences of people on the Indian subcontinent through literature and film, beginning with the Ramayana and including medieval tales, modern novels, and feature films. Formerly HNDI 1011.

**HIND 1020-5. Beginning Hindi 2.** Continuation of HIND 1010. Provides a thorough introduction to the modern Hindi language, emphasizing speaking, listening, reading and writing skills. Proficiency-based course aims to place the student in the context of the native-speaking environment from the beginning of the course. Provides opportunities to participate in local South Asian cultural activities and events. Prereq., HIND 1010 (min. grade C). Formerly HNDI 1020.

**HIND 2010-5. Intermediate Hindi 1.** An intermediate course in the Hindi language. Emphasizes students' speaking, listening, reading and writing skills and culturally appropriate language use. Covers a variety of topics, placing the student in the native-speaking environment and offering opportunities to participate in local South Asian cultural events. Credit not granted for this course and ASIA 2420. Formerly HNDI 2010. Meets MAPS requirement for foreign language.

**HIND 2020-5. Intermediate Hindi 2.** Continuation of HIND 2010. Enhances students' speaking, listening, reading and writing skills and culturally appropriate language use. Covers a variety of topics, placing the student in the native-speaking environment and offering opportunities to participate in local South Asian cultural events. Prereq., HIND 2010 (min. grade C) or equivalent. Formerly HNDI 2020.

**HIND 2441-3. Screening India: A History of Bollywood Cinema.** Provides a critical overview of one of the world's largest and most beloved film industries, the popular Hindi cinema produced in Bombay (Mumbai) and consumed around the world under the label "Bollywood." Focus on the post-Independence era to the present, with introduction to key films, directors, stars, genres, formal techniques, and themes, as well as critical analyses of these and other topics. Formerly HNDI 2441.

**HIND 3010-3. Advanced Hindi 1.** Emphasizes speaking, listening and conversational fluency in Hindi, with a focus on culturally appropriate expression and practical knowledge. An effort will be made to allow the student an opportunity to participate in local South Asian cultural events. Prereq., HIND 2020 (min. grade C). Formerly HNDI 3010.

**HIND 3020-3. Advanced Hindi 2.** Continuation of HIND 3010. Emphasizes speaking, listening, and conversational fluency in Hindi, with a focus on culturally appropriate expression and practical knowledge. An effort will be made to allow the student an opportunity to participate in local South Asian cultural events. Prereq., HIND 3010 (min. grade C). Formerly HNDI 3020.

**HIND 3651-3. Living Indian Epics: The Ramayana and the Mahabharata in the Modern Political Imagination.** Explores the *Ramayana* and *Mahabharata*, two fundamental mythological pillars of Indian society, through literature, comic books, film, television, and political rhetoric as a means of examining major issues of religion, gender, popular culture, and social politics in contemporary India.

**HIND 3661-3. South Asian Diasporas: Imagining Home Abroad.** Examines fundamental questions of home, nation, identity, ethnicity, and foreignness in the context of the enormous South Asian diaspora. By means of literature, ethnography, and film, the various connotations of diaspora will be explored along with the cultural productions of members of the South Asian diaspora (both Indian and Pakistani).

**HIND 3811-3. The Power of the Word: Subversive and Censored 20th Century Indo-Pakistani Literature.** Provides an overview of a selection of writings by important 20th century Indo-Pakistani authors, which will permit students to get acquainted with Indian literature. Provides insight into the experience of social and political events in the 20th century and the reaction of the government to the critical analysis and portrayal of these events. Taught in English. Formerly HNDI 3811. Approved for arts and sciences core curriculum: human diversity.

**HIND 3821-3. The Mahabharata as Literature, Performance, Ideology.** Offers an in-depth introduction to the *Mahabharata*, reputedly the world's longest epic and one of the foundational works of Indian civilization. Synopsis of the full text and selected excerpts will be read, including a translation of the spiritual classic, Bhagavad Gita. Recent scholarship on the poem's historical, ritual, and mythic contexts as well as on its performance traditions will also be examined. Formerly HNDI 3821.

**HIND 3831-3. The Many Faces of Krishna in South Asia Literature and Culture.** Using both textual and visual sources, the multiple facets of Krishna in Indian religious experience will be explored through poetry and prose, painting and sculpture, music, dance, and drama. Formerly HNDI 3831.

## Indonesian

**INDO 1010-5. Beginning Indonesian 1.** Provides a thorough introduction to the modern Indonesian language, emphasizing speaking, listening, reading and writing skills. This course is proficiency-based. Activities aim to place

the student in the context of the native-speaking environment from the very beginning. Students will be provided with opportunities to participate in local Southeast Asian cultural events. Students with previous experience with Indonesian or Malay should contact the instructor for placement.

**INDO 1011-3. Introduction to Indonesian Civilization.** Provides an overview of the past and present of Indonesia, the people, and their cultures. Discussions with guest speakers, and on films, music, and images, will allow them to get acquainted with important issues and values in today's Indonesia. A closer look to the five major islands in the archipelago will introduce them to the diversity of this nation's 234,693,997 people. Taught in English.

**INDO 1020-5. Beginning Indonesian 2.** Continuation of INDO 1010. Provides a thorough introduction to the modern Indonesian language, emphasizing the context of the native-speaking environment from the very beginning. Students will be provided with opportunities to participate in local Southeast Asian events. Students with previous experience with Indonesian or Malay should contact the instructor for placement. Prereq., INDO 1010 (min. grade C).

**INDO 2010-4. Intermediate Indonesian 1.** Aims to increase the students' proficiency in listening, speaking, reading, and writing in modern Indonesian. Students will use only Indonesian in class. Evaluation based on classroom performance, homework, tests, and final project. Students will be provided with opportunities to participate in local Southeast Asian cultural events. Students with previous experience with Indonesian or Malay should contact the instructor for placement. Prereqs., INDO 1010 and 1020 (min. grade C). Meets MAPS requirement for foreign language.

**INDO 2020-4. Intermediate Indonesian 2.** Continuation of INDO 2010. Aims to increase the students' proficiency in listening, speaking, reading, and writing in modern Indonesian. Students will use only Indonesian in class. Evaluation based on classroom performance, homework, tests, and final project. Students will be provided with opportunities to participate in local Southeast Asian cultural events. Students with previous experience with Indonesian or Malay should contact the instructor for placement. Prereq., INDO 2010 (min. grade C).

**INDO 3010-3. Advanced Indonesian 1.** Develops students' proficiency in language skills in modern Indonesian. Emphasis is on students' command in leading discussion and writing in formal Indonesian. Students read classic and contemporary authentic materials. Evaluation based on classroom performance, essays, and final project. Students will be provided with opportunities to participate in local Southeast Asian cultural events. Fluent Indonesian or Malay speakers who wish to learn more about Indonesian cultures should contact the instructor for placement. Prereq., INDO 2020 (min. grade C).

**INDO 3020-3. Advanced Indonesian 2.** Continuation of INDO 3010. Develops students' proficiency in language skills in modern Indonesian. Emphasis is on students' ability to lead discussion and write in formal Indonesian. Students read classic and contemporary authentic materials. Evaluation based on classroom performance, essays, and final project. Students will be provided with opportunities to participate in local Southeast Asian cultural events. Fluent Indonesian or Malay speakers who wish to learn more about Indonesian cultures should contact the instructor for placement. Prereq., INDO 3010 (min. grade C).

## Japanese

**JPNS 1010-5. Beginning Japanese 1.** Provides a thorough introduction to modern Japanese, emphasizing speaking, listening, reading, and writing in a cultural context.

**JPNS 1020-5. Beginning Japanese 2.** Continuation of JPNS 1010. Prereq., JPNS 1010 (min. grade C).

**JPNS 2110-5. Intermediate Japanese 1.** Continued study of oral and written modern Japanese in a cultural context. Prereq., JPNS 1020 or equivalent (min. grade C). Meets MAPS requirement for foreign language.

**JPNS 2120-5. Intermediate Japanese 2.** Continuation of JPNS 2110. Prereq., JPNS 2110 (min. grade C).

**JPNS 3110-5. Advanced Japanese 1.** Enhances student competence and performance in Japanese language in a holistic and integrative manner. Prereq., JPNS 2120 (min. grade C).

**JPNS 3120-5. Advanced Japanese 2.** Continuation of JPNS 3110. Enhances student competence and performance in Japanese language in a holistic and integrative manner. Prereq., JPNS 3110 (min. grade C).

**JPNS 4030-3. Japanese Syntax.** Deals with syntactic phenomena from five areas of Japanese grammar that cause the most difficulty for learners. Their characteristics are explored in forms and discursive functions that go beyond the explanations in basic, prescriptive grammars of Japanese. Prereq., JPNS 3120 or 4120, or instructor consent.

**JPNS 4070-3. Second Language Acquisition of Japanese.** Studies language acquisition theories and research on Japanese as a second language (JSL). Covers the issues in JSL from linguistic, cognitive, and sociolinguistic perspectives: orthography, grammar, phonology, and vocabulary in the contexts of teaching and learning JSL. Prereq., instructor consent. Same as JPNS 5070.

**JPNS 4080-3. Kanji in Japanese Orthography.** Covers the issues in kanji research from historical, sociolinguistic, linguistic, cognitive perspective and vocabulary acquisition theories in the context of teaching and learning the Japanese language. Same as JPNS 5080.

**JPNS 4110-3. Advanced Readings in Modern Japanese 1.** Surveys a variety of material written in modern Japanese, including texts from literature, the social sciences, religion, and cultural history. Emphasizes content and style. Texts and selections vary from year to year. Prereq. JPNS 3120 (min. grade C).

**JPNS 4120-3. Advanced Readings in Modern Japanese 2.** Continuation of JPNS 4110. Texts and selections vary from year to year. Prereq., JPNS 4110 (min. grade C).

**JPNS 4210-3. Contemporary Japanese 1: Current Issues.** Offers intensive review of Japanese language skills beyond the first eight semesters, and cultivates further proficiency. Readings will be selected from a wide range of contemporary writings that reflect and represent issues in Japanese as well as global communities. The course emphasizes all skills: reading, listening, writing, speaking, and translation. Instructional technology is extensively integrated into the curriculum. Prereq., JPNS 4120 or instructor consent.

**JPNS 4220-3. Contemporary Japanese 2: Current Issues.** Continues developing Japanese language skills beyond the first eight semesters. Cultivates further proficiency at an advanced and superior level. Readings are selected from a wide range of contemporary writings that reflect and represent issues in Japanese as well as global communities. Emphasizes all skills: reading, listening, writing, speaking, and translation. Instructional technology is extensively integrated into the curriculum. Prereq., JPNS 4210 or instructor consent.

**JPNS 4300-3. Open Topics: Readings in Japanese.** Examines selected texts on a particular topic taught by regular or visiting faculty. Topics change each term. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**JPNS 4310-3. Classical Japanese 1.** Introduces reference tools for reading classical Japanese, and grammar, vocabulary, and use of scripts in premodern Japanese, focusing on the 10th century *Taketori Monogatari* and the 13th century *Hojoki*. Prereq., JPNS 3110. Recommended prereqs., JPNS 3120, 3811, 3821.

**JPNS 4320-3. Classical Japanese 2.** Continuation of JPNS 4310. Surveys changes in Japanese literary language from the Nara (eighth century) to Meiji (late 19th century) periods. Attention given to changes in grammar, vocabulary, and use of scripts in premodern Japanese. Introduces representative works of classical Japanese literature of all periods. Prereq., JPNS 4310.

**JPNS 4900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**JPNS 4950-3. Honors Thesis.**

**JPNS 5010-3. Bibliography and Research Methods.** Introduces research materials on Japan in Japanese and Western languages, including bibliographic tools, style sheets, and library resources. Overview of secondary sources and publication outlets/methods of disseminating research. Prereq., graduate standing or instructor consent.

**JPNS 5020-3. Methods of Teaching Japanese.** Surveys pedagogical theory and methods for the teaching of Japanese as a second language, including issues of presentation, interaction, and evaluation. Prereq., graduate standing or instructor consent.

**JPNS 5050-3. Japanese Sociolinguistics.** Surveys past achievements and current research concerns of Japanese sociolinguists in areas such as speech varieties, language behavior and attitude, and linguistic contact and change, as well as their guiding theories and central fieldwork methods. Prereq., graduate standing or instructor consent.

**JPNS 5060-3. Advanced Japanese Syntax.** Examines controversial syntactic topics that have inspired a variety of explanations. Alternative linguistic explanations are sought within the framework of an analytical investigation from the viewpoint of language dynamics. May be repeated up to 6 total credit hours. Prereqs., JPNS 4030 or instructor consent.

**JPNS 5070-3. Second Language Acquisition of Japanese.** Prereq., graduate standing or instructor consent. Same as JPNS 4070.

**JPNS 5080-3. Kanji in Japanese Orthography.** Prereq., graduate standing or instructor consent. Same as JPNS 4080.

**JPNS 5150-3. Japanese Literary Translation.** Explores theories and practice of translation of literary texts as applied to Japanese-English translation; strategies for handling a variety of texts; and professional standards and ethics. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**JPNS 5170-3. Japanese for Sinologists.** An accelerated course in modern scholarly Japanese for students with a basic foundation in Japanese and an advanced knowledge of Chinese. Focus is on materials in Japanese that relate to Chinese civilization and includes an introduction to *kanbun*. Prereq., one year of modern Japanese, graduate-level command of Chinese, or instructor consent.

**JPNS 5210-3. Classical Prose Literature.** Examines selected prose works and authors from the Classical, or Heian, period (784–1185). Texts may include selections from diaries, tale literature, and *zuihitsu* such as *Izumi Shikibu Nikki*, *Genji Monogatari*, and *Makura no Soshi*. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5220-3. Waka, Renga, and Haiku.** Studies the three most important poetic forms in Japanese literary history. Emphasizes the reading and analysis of selected texts and authors that best represent these genres. Readings include selections from the first eight imperial poetry anthologies (*hachidaishu*), famous renga sequences (*Minase Sangin Hyakuin*, for example), and the haiku of Basho. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5280 (1-3). Topics in Classical Japanese Literature.** Studies a specific problem or issue in classical (eighth through twelfth century) Japanese literature, e.g., the development of specifically Japanese theories of literature or the concept of genre in the Japanese tradition. Topics vary from year to year. May be repeated up to 6 total credit hours.

**JPNS 5310-3. Advanced Classical Japanese I.** Focuses on stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras. Prereq., JPNS 4310 or instructor consent.

**JPNS 5320-3. Advanced Classical Japanese II.** Advanced analysis of stylistic, grammatical, and orthographic variations in texts of the classical, medieval, and early modern eras, including *kanbun* and *hentaigana*; translation and explication of texts. Prereq., JPNS 5310 (formerly 5160) or instructor consent.

**JPNS 5410-3. Medieval Prose Literature.** Focuses on selected prose works and authors from the medieval, or Kamakura and Muromachi periods (1185–1600). Texts may include selections from a variety of war tales, histories, courtly fiction, diaries, memoirs, short prose narratives (*otogi-zoshi*), Noh plays, and Buddhist literature such as *Heike Monogatari*, *Tovazugatari*, *Izayoi Nikki*, *Tsurezuregusa*, and *Shasekishu*. Texts and selections vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5420-3. Japanese Buddhism and Literature.** Studies selected works from the Japanese literary tradition in which Buddhism plays a significant thematic role. Focuses on texts such as the *Nihon Ryoiki*, Buddhist poetry (*Shakkyo-Ka*) from the imperial poetry anthologies, *Heike Monogatari*, *Hojoki*, the poetry of Saigyō and Basho, and selected noh plays. Texts and selections

vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5480 (1-3). Topics in Medieval Literature.** Focuses on a specific problem or issue in medieval literature, e.g., the spread of literary composition beyond the court. Topics vary from year to year. May be repeated up to 6 total credit hours.

**JPNS 5610-3. Japanese Dramatic Literature.** Examines major writers and texts of the *noh*, *kyogen*, *kabuki*, and *bunraku* theaters, including the plays and critical writings of such authors as Kannami Kiyotsugu, Zeami Motokiyo, Konparu Zenchiku, and Chikamatsu Monzaemon. Texts and secondary readings vary from year to year. May be repeated up to 6 total credit hours. Prereq., two semesters of classical Japanese language.

**JPNS 5810-3. Modern Japanese Literature.** Studies selected texts in Japanese literature from the Meiji Restoration (1868) to the end of the Pacific War. Surveys various literary genres, emphasizing the development of the modern novel as an aspect of Japan's response to Western cultural forms. The unique cultural politics of each of the periods (Meiji, Taisho, and Showa) are illuminated through the filter of both canonical and more marginalized texts. Specific selections vary from year to year. May be repeated up to 6 total credit hours.

**JPNS 5820-3. Contemporary Japanese Literature.** Covers developments in Japanese prose fiction, from the end of the Pacific War in 1945 to the present. Late modern texts of writers such as Mishima Yukio, Kawabata Yasunari, Enchi Fumiko, and Tanizaki Jun'ichiro (generally taken to represent modern Japanese literature) are reread in the light of works by more recent writers (and critics) such as Oe Kenzaburo, Yoshimoto Takaaki, Murakami Haruki, and Yamada Eimi. May be repeated up to 6 total credit hours.

**JPNS 5830-3. Readings in Modern and Contemporary Japanese Thought and Culture.** Examines central issues in Japanese culture and society since the Meiji Restoration (1868) through selected readings of the works of major writers in the fields of literature, anthropology, feminism, political science, and religion, among others. Provides a broad context for cultural studies in modern and contemporary Japan by positioning the most important commentators within their historical and social situations. May be taken for credit twice.

**JPNS 5880 (1-3). Topics in Modern Literature and Culture.** Close study of a specific problem or issue in modern or contemporary literature or culture: e.g., transwar literary nationalism. May be repeated up to 6 total credit hours, provided the topics vary.

**JPNS 5900 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**JPNS 6900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**JPNS 6940 (1-3). Japanese Master's Degree Candidate.**

**JPNS 6950 (1-6). Japanese Master's Thesis.**

### *Japanese Courses in English*

**JPNS 1051-3. Masterpieces of Japanese Literature in Translation.** Surveys Japanese thought and culture through careful reading and discussion of selected masterworks of Japanese literature in translation. Texts include significant works of poetry, fiction, drama, diaries, and essays, from ancient times to the present. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**JPNS 2441-3. Film and Japanese Culture.** Examines 20th century Japanese culture through its literature and film. Studies literary works and films by Ozu, Kurosawa, Mizoguchi, and contemporary animators, among others. Considers cultural issues raised in film in light of modern Japanese history and literature. Requires no knowledge of Japanese.

**JPNS 3441-3. Language and Japanese Society.** Deals with major linguistic characteristics of Japanese as a medium of communication. Discusses complex linguistic processing of social status and empathy relationships, for example, with reference to the structure of Japanese society from ancient to contemporary times. Requires no knowledge of Japanese. Recommended prereq., JPNS 2120.

**JPNS 3811-3. Classical Japanese Literature in Translation.** Surveys the major works and authors of classical Japanese literature, both poetry and prose, from the earliest historical records and literary anthologies through the He-



ian period (784–1185). Taught in English. Recommended prereq., JPNS 1051. Same as HUMN 3811.

**JPNS 3821-3. Medieval Japanese Literature in Translation.** Surveys the major works and authors of medieval Japanese (poetry, prose, and drama) from the Kamakura and Muromachi periods (1185–1600). Taught in English. Recommended prereq., JPNS 1051.

**JPNS 3831-3. Early Modern Japanese Literature in Translation.** Surveys the major works, authors, and genres of literature from the Tokugawa through Meiji periods in their historical and cultural contexts. Attention is given to various approaches of literary analysis and interpretation. Taught in English. Recommended prereq., JPNS 1051.

**JPNS 3841-3. Modern Japanese Literature in Translation.** Surveys the major works, authors, and genres of literature from the late Meiji period and 20th century in their historical and cultural contexts. Attention is given to various approaches of literary analysis and interpretation. Taught in English. Recommended prereq., JPNS 1051. Same as HUMN 3841.

## Korean

**KREN 1010-5. First-Year (Beginning) Korean 1.** Trains students in elementary conversational and writing skills and provides grounding in the basic idiomatic and syntactical features of Korean, through lectures, drills, and language laboratory sessions based on set dialogues and readings.

**KREN 1011-3. Introduction to Korean Civilization.** Introduces the history of Korean culture within the context of political, social, and economic history. Covers the old Choson dynasty to present day Korea. Approved for arts and sciences core curriculum: human diversity.

**KREN 1020-5. First-Year (Beginning) Korean 2.** Continuation of KREN 1010. Prereq., KREN 1010 (min. grade C) or instructor consent.

**KREN 2110-5. Second-Year (Intermediate) Korean 1.** Extends the conversational and written skills acquired at the elementary level. Although emphasis remains on spoken Korean, readings are increased, elementary writing skills are introduced gradually, and some Sino Korean characters are taught. Prereq., KREN 1020 (min. grade C) or instructor consent. Meets MAPS requirement for foreign language.

**KREN 2120-5. Second-Year (Intermediate) Korean 2.** Continuation of KREN 2110. Prereq., KREN 2110 (min. grade C) or instructor consent.

**KREN 2441-3. Film and Korean Culture.** Introduces Korean/South Korean cinema from colonial period to the contemporary including old Korean black and white films, the earliest talkie films and contemporary art films. Considers cinema as a window to see the tumultuous and diverse culture of modern Korea. Taught in English. No prior knowledge of Korea, Korean film or film art is required.

**KREN 3110-5. Advanced Korean 1.** Promotes an advanced level of speaking, reading, and writing. Focuses on contemporary business Korean language as reflected in various Korean media such as newspapers, magazines, and television. The goal is to acquire Korean language skills at a level that allows students to conduct business activities. Prereq., KREN 2120 (min. grade C) or instructor consent.

**KREN 3120-5. Advanced Korean 2.** This second semester of Korean offers advanced level (2) speaking and writing. Focuses on understanding contemporary Korean languages as reflected in various communication media, such as print, TV, and films to help students understand Korean in a variety of contexts. Students should be quite fluent in commanding Korean after this course.

**KREN 3441-3. Religion and Culture in Korea.** Examines major religious traditions of Korea, such as mythology, indigenous practices, doctrinal and meditation Buddhism, and Early and Neo-Confucianism and Christianity, and new religions in modern times.

**KREN 3841-3. Modern Korean Literature in English Translation.** Surveys masterpieces of modern Korean literature written by significant Korean/Korean American authors in English. Provides various literary and theoretical frameworks to understand Korean literature within the context of Asian global culture. Covers from colonial period to the present. No prior knowledge of Korea or Korean literature is required.

**KREN 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Tibetan

**TBTN 3210-4. Beginning Literary Tibetan 1.** Provides a thorough introduction to literary and colloquial forms of Tibetan. This course focuses on the grammatical foundation of the language, the acquisition of basic vocabulary, and training in the skills of pronunciation, conversation, handwriting, and spelling.

**TBTN 3220-4. Beginning Literary Tibetan 2.** Continuation of TBTN 3210. Provides a thorough introduction to literary and colloquial forms of Tibetan. This course continues the grammar and vocabulary work begun in Tibetan 1 by studying actual Tibetan text and moving to more advanced conversation topics. Students develop oral, aural, and written skills to produce an overall knowledge of the language. Prereq., TBTN 3210 (min. grade C).

**TBTN 4210-4. Intermediate Literary Tibetan 1.** Aims at increasing students' proficiency in literary and colloquial forms of Tibetan. This course expands knowledge of the grammar and vocabulary of literary Tibetan through translating texts in a variety of genres and also continues to develop knowledge of spoken modern Tibetan. Prereqs., TBTN 3210 and 3220 (min. grade C).

**TBTN 4220-4. Intermediate Literary Tibetan 2.** Continuation of TBTN 4210. Aims at increasing students' proficiency in literary and colloquial forms of Tibetan. This course expands knowledge of the grammar and vocabulary of literary Tibetan through translating texts in a variety of genres and also continues to develop knowledge of spoken modern Tibetan. Prereq., TBTN 4210 (min. grade C).

## Asian Studies

**ASIA 1000-3. Introduction to South and Southeast Asian Civilizations.** Interdisciplinary survey course, emphasizing cultural developments in the Indian subcontinent that influenced Indonesia and mainland Southeast Asia. Foundation course required for the Asian studies major. Approved for arts and sciences core curriculum: human diversity or historical context.

**ASIA 4300-3. Open Topics in Asian Literature and Culture.** Examines selected texts on a particular topic. Taught by regular or visiting faculty. Topics change each term. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASIA 4830-3. Senior Thesis or Project in Asian Studies.** Studies an approved Asian topic, following guidelines established by the program director. Undertaken either as an independent study with an Asian studies faculty member or as part of a seminar course approved by the Asian studies faculty representative in the student's disciplinary option. Restricted to Asian Studies majors.

**ASIA 4840 (1-3). Independent Study.** Provides an independent study opportunity, by special arrangement with Asian Studies faculty, for students with particular Asian Studies interests. May be repeated up to 6 total credit hours. Restricted to Asian Studies majors.

**ASIA 4930 (1-2). Engage Asia: Internship in Asian Studies.** Matches students with supervised internships in which they share academic learning of topics in Asian culture, history, or language with, for example, teachers and students in the Boulder Valley School District. Students work with Center for Asian Studies research and teaching faculty to, for example, research and prepare lessons they will present in BVSD K–12 classes on world cultures, world geography, world history, and Asian languages. May be repeated up to 6 total credit hours. Recommended prereq., Asian language and culture courses.

## Astrophysical and Planetary Sciences

**ASTR 1010-4. Introductory Astronomy 1.** Introduces principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Earth, Sun, moon, planets, and origin of life. Requires nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1110, but with additional recitation and lab experience. Also similar

to ASTR 1030. Students may receive credit for only one of ASTR 1010, 1110, or 1030. Meets MAPS requirement for natural science: lab or non-lab. Approved for arts and sciences core curriculum: natural science.

**ASTR 1020-4. Introductory Astronomy 2.** Introduces principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Sun, stars, birth and death of stars, neutron stars, black holes, galaxies, quasars, and the organization and origins of the universe. Offers nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1120, but with sequence link to ASTR 1010. Also similar to ASTR 1040. Students may receive credit for only one of ASTR 1020, 1120, or 1040. Prereq., ASTR 1010 or 1110. Approved for arts and sciences core curriculum: natural science.

**ASTR 1030-4. Accelerated Introductory Astronomy 1.** Covers principles of modern astronomy summarizing our present knowledge about the Earth, Sun, moon, planets, and origin of life. Requires nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Required in ASTR major/minor. Prereq. or coreq., Calculus I (MATH 1300 or APPM 1350). Students may receive credit for only one of ASTR 1030, 1010, or 1110. Similar to ASTR 1010 and 1110, but taught at a higher intellectual level, including a significant amount of quantitative analysis. Approved for arts and sciences core curriculum: natural science.

**ASTR 1040-4. Accelerated Introductory Astronomy 2.** Covers principles of modern astronomy summarizing our present knowledge about the sun, stars, birth and death of stars, neutron stars, black holes, galaxies, quasars, and the organization and origins of the universe. Offers opportunities to attend nighttime observing sessions at Sommers-Bausch Observatory. Some sessions are at the Fiske Planetarium. Required in ASTR major/minor. Prereq., ASTR 1030. Prereq. or coreq., Calculus I (MATH 1300 or APPM 1350). Students may receive credit for only one of ASTR 1020, 1040, or 1120. Similar to ASTR 1020 and 1120 but taught at a higher intellectual level including a significant higher intellectual level including a significant amount of quantitative analysis. Approved for arts and sciences core curriculum: natural science.

**ASTR 1110-3. General Astronomy: The Solar System.** Examines principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Earth, Sun, moon, planets, and the origin of life. Offers opportunities to attend nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1010, without lab and recitation. Also similar to ASTR 1030. ASTR 1110 and 1120 may be taken in either order. Students may receive credit for only one of ASTR 1110, 1010, or 1030. Meets MAPS requirement for natural science: nonlab. Approved for arts and sciences core curriculum: natural science.

**ASTR 1120-3. General Astronomy: Stars and Galaxies.** Examines principles of modern astronomy for nonscience majors, summarizing our present knowledge about the Sun, stars, neutron stars, black holes, interstellar gas, galaxies, quasars, and the structure and origins of the universe. Offers opportunities to attend nighttime observation sessions at Sommers-Bausch Observatory and Fiske Planetarium. Similar to ASTR 1020, without sequence link to ASTR 1010. Also similar to ASTR 1040. ASTR 1110 and 1120 can be taken in either order. Students may receive credit for only one of ASTR 1120, 1020, or 1040. Approved for arts and sciences core curriculum: natural science.

**ASTR 2000-3. Ancient Astronomies of the World.** Documents the numerous ways in which observational astronomy and cosmology have been features of ancient cultures. Includes naked eye astronomy, archaeoastronomy, ethnoastronomy, concepts of time, calendrics, cosmogony, and cosmology. Approved for arts and sciences core curriculum: human diversity or natural science.

**ASTR 2010-3. Modern Cosmology: Origin and Structure of the Universe.** Introduces modern cosmology to nonscience majors. Covers the Big Bang; the age, size, and structure of the universe; and the origin of the elements and of stars, galaxies, the solar system, and life. Approved for arts and sciences core curriculum: natural science.

**ASTR 2020-3. Introduction to Space Astronomy.** Discusses reasons for making astronomical observations from space, scientific goals, practical requirements for placing instruments in space, politics of starting new programs, and selected missions. Prereq., ASTR 1010, 1020, 1110, or 1120. Approved for arts and sciences core curriculum: natural science.

**ASTR 2030-3. Black Holes.** Black holes are one of the most bizarre phenomena of nature. Students are introduced to the predicted properties of black holes, astronomical evidence for their existence and formation, and modern ideas about space, time, and gravity. Approved for the arts and sciences core curriculum: natural science.

**ASTR 2500-3. Gateway to Space.** Introduces the basics of atmospheric and space sciences, space exploration, spacecraft design, rocketry, and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry. Recommended prereqs., APPM 1360 or MATH 2300 and PHYS 1120 or ASTR 1040. Restricted to ASTR or PHYS majors. Same as ASEN 2500. Similar to ASEN 4500.

**ASTR 2600-3. Computational Techniques.** Introduces practical research skills and provides orientation to computational tools commonly used in research by astrophysicists and planetary scientists, including UNIX and IDL. Restricted to ASTR majors.

**ASTR 2840 (1-3). Independent Study.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 3300-3. Extraterrestrial Life.** Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Prereq., one-year sequence in a natural science. Same as GEOL 3300.

**ASTR 3510-4. Observations and Instrumentation 1.** Lab course in astronomical observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, basic optical design and instrumentation, and statistical analysis of data, with emphasis on imaging applications. A significant number of observation sessions are required. Prereq. or coreq., Calculus 2 (MATH 2300 or APPM 1360), one year of college physics, and one year of college astronomy. Restricted to ASTR majors. Elective for APS major and minor.

**ASTR 3520-4. Observations and Instrumentation 2.** Lab course in observation and instrumentation. Hands-on exercises include obtaining and analyzing multi-wavelength data, optical design and instrumentation, and statistical analysis, with emphasis on spectroscopy. A significant number of observation sessions are required. Prereq., ASTR 3510 or instructor consent. Restricted to ASTR majors. Elective for APS major and minor.

**ASTR 3710-3. Formation and Dynamics of Planetary Systems.** Covers the origin of planetary systems and their dynamical evolution. Topics include the physics and chemistry of planetary formation, orbital mechanics, and extra-solar planets. ASTR 3710, 3720, and 3750 may be taken in any order. Prereqs., PHYS 1110 and 1120, and calculus (MATH 1300 and 2300, or APPM 1350 and 1360). Elective for APS major and minor.

**ASTR 3720-3. Planets and Their Atmospheres.** Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor. Prereqs., PHYS 1110 and 1120, and either MATH 1300 and 2300, or APPM 1350 and 1360, or instructor consent. Same as ATOC 3720.

**ASTR 3730-3. Astrophysics 1: Stellar and Interstellar.** ASTR 3730 and 3830 provide a year-long introduction to physical processes, observations, and current research methods in stellar, interstellar, galactic, and extra-galactic astrophysics, with astronomical applications of gravity, radiation processes, spectroscopy, gas dynamics, and plasma physics. Prereqs. or coreqs., PHYS 2130 or 2170, and MATH 2400 or APPM 2350. Elective for APS major and minor.

**ASTR 3740-3. Cosmology and Relativity.** Special and general relativity as applied to astrophysics, cosmological models, observational cosmology, experimental relativity, and the early universe. Prereqs. or coreqs., PHYS 2130 or 2170, and MATH 2400 or APPM 2350. Elective for APS major and minor.

**ASTR 3750-3. Planets, Moons, and Rings.** Approaches the physics of planets, emphasizing their surfaces, satellites, and rings. Topics include formation and evolution of planetary surfaces, history of the terrestrial planets, and dynamics of planetary rings. Both ASTR 3720 and ASTR 3750 may be taken for credit

in any order. Prereqs., PHYS 1110 and 1120, and calculus (MATH 1300 and 2300, or APPM 1350 and 1360). Elective for APS major and minor.

**ASTR 3760-3. Solar and Space Physics.** Explores the physical processes linking the Sun and planets, emphasizing solar radiative and particulate variability and the response of planetary atmospheres and magnetospheres. Topics include the solar dynamo, solar wind, coronal mass ejections, cosmic ray modulation, magnetospheres, aurora, the space environment, and climate variability. Prereqs./coreqs., PHYS 2130 or 2170 and MATH 2400 or APPM 2350. Recommended prereq., PHYS 3310. Elective for APS major and minor.

**ASTR 3800-3. Introduction to Scientific Data Analysis and Computing.** Covers analytical and numerical techniques used in scientific data analysis, including statistical analysis, error analysis, functional fitting, spectral analysis, image processing, and testing theoretical compliance. Examples are from space-based and ground-based astronomy. The computer laboratories are based on IDL which is introduced in the course. Prereqs. or coreqs., ASTR 1040 or equivalent, PHYS 1120 or equivalent, and MATH 2400 or APPM 2350. Restricted to ASTR and PHYS majors. Credit not granted for this course and ASTR 2800.

**ASTR 3830-3. Astrophysics 2: Galactic and Extragalactic.** ASTR 3730 and 3830 provide a year-long introduction to physical processes, observations, and current research methods in stellar, interstellar, galactic, and extragalactic astrophysics, with astronomical applications of gravity, radiation processes, spectroscopy, gas dynamics, and plasma physics. Prereqs. or coreqs., ASTR 3730, and PHYS 2130 or 2170, and MATH 2400 or APPM 2350. Elective for APS major and minor.

**ASTR 4330-3. Cosmochemistry.** Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular. Prereq., upper-division undergrad or grad standing in physical science. Recommended prereq., upper-division undergrad CHEM, PHYS, or MATH. Same as ASTR 5330 and GEOL 4330.

**ASTR 4800-3. Space Science: Practice and Policy.** Exposes students to current controversies in science that illustrate the scientific method and the interplay of observation, theory, and science policy. Students research and debate both sides of the issues, which include strategies and spin-offs of space exploration, funding of science, big vs. small science, and scientific heresy and fraud. Prereqs., ASTR 1110 and 1120, or equivalent, or PHYS 1110 and 1120, or PHYS 2010 and 2020.

**ASTR 4840 (1-3). Independent Study.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 4841 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**ASTR 5110-4. Atomic and Molecular Processes.** Explores the application of quantum physics and statistical mechanics to problems in astrophysics, space physics and planetary science, with an emphasis on radiative processes and spectroscopy of atoms and molecules. Prereq., graduate standing or instructor consent.

**ASTR 5120-4. Radiative and Dynamical Processes.** An introduction to radiative and dynamical processes aimed at graduate students in astrophysics, space physics and planetary science. Covers transport phenomena, the macroscopic treatment of radiation fields, magnetohydrodynamics and dynamical processes associated with planetary orbits and N-body systems. Prereq., graduate standing or instructor consent.

**ASTR 5140-3. Astrophysical and Space Plasmas.** Teaches magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies. Prereq., graduate standing in APS or physics. Same as PHYS 5141.

**ASTR 5150-3. Introductory Plasma Physics.** Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzmann equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications, and experimental plasma physics (laboratory). Same as PHYS 5150.

**ASTR 5300-3. Introduction to Magnetospheres.** Introduces solar and stellar winds, and planetary and stellar magnetospheres. Acquaints students with the guiding center theory for particle motion, magnetospheric topology, convection, radiation belts, magnetic storms and substorms, and auroras.

**ASTR 5330-3. Cosmochemistry.** Same as ASTR 4330 and GEOL 5330.

**ASTR 5400-3. Introduction to Fluid Dynamics.** Covers equations of fluid motion relevant to planetary atmospheres and oceans, as well as stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers, and wave motions. Introduces instability theory, nonlinear equilibration, and computational methods in fluid dynamics. Same as ATOC 5400.

**ASTR 5410-3. Fluid Instabilities, Waves, and Turbulence.** Involves linear and nonlinear analyses of small-scale waves and instabilities in stratified fluids, with effects of rotation. Studies internal gravity and acoustic waves with terrestrial, planetary, and astrophysical applications. Also studies thermal and double-diffusive convection, homogeneous and stratified shear flow instabilities. Examines these topics from the onset of small amplitude disturbances to their nonlinear development and equilibration. Prereq., ASTR 5400 or ATOC 5060. Same as ATOC 5410.

**ASTR 5540-3. Mathematical Methods.** Presents an applied mathematics course designed to provide the necessary analytical and numerical background for courses in astrophysics, plasma physics, fluid dynamics, electromagnetism, and radiation transfer. Topics include integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations. Draws illustrative examples from the areas of physics listed above. Same as ATOC 5540.

**ASTR 5550-3. Observations, Data Analysis and Statistics.** Introduces multi-wavelength observational techniques, their limitations and effects of various noise sources. Describes basic data handling, error analysis, and statistical tests relevant to modeling. Topics include probability distributions, model-fitting algorithms, confidence intervals, correlations, sampling and convolution. Students derive physical measurements and uncertainties with hands-on analysis of real datasets. Prereq., senior level undergraduate physics or instructor consent.

**ASTR 5560-3. Radiative Processes in Planetary Atmospheres.** Applies radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse effect; and inversion methods and climate models. Prereq. or coreq., ASTR 5110. Recommended prereq., ATOC 5235. Same as ATOC 5560.

**ASTR 5700-3. Stellar Structure and Evolution.** Examines basic stellar astronomy: stellar classifications, kinematics, populations and distributions, and H-R diagrams. Covers principles of stellar structure, including energy generation and energy transport by radiation and convection. Includes stellar evolution theory, including compact objects. Prereq., undergraduate physics.

**ASTR 5710-3. High-Energy Astrophysics.** Studies astrophysics of UV, x-ray, gamma-ray, and cosmic-ray sources, including fundamentals of radiative and particle processes, neutron stars, black holes, pulsars, quasars, supernovas and their remnants; stellar flares; accretion disks; binary x-ray sources; and other cosmic x-ray sources. Prereq., senior-level undergraduate physics.

**ASTR 5720-3. Galaxies.** Highlights the classification, structure, content, dynamics, and other observational properties of galaxies, active galaxies, and clusters of galaxies. Discusses Hubble's Law, the cosmic distance scale, and the intergalactic medium. Prereq., undergraduate physics.

**ASTR 5730-3. Stellar Atmospheres and Radiative Transfer.** Explores stellar atmospheres: basic stellar atmospheres, spectral line formation, interpretation of stellar spectra, and model atmospheres. Examines solar physics: the Sun as a star, solar cycle, chromospheric and coronal structure, energy balance, magnetic field, and solar wind. Prereqs., ASTR 5110 and undergraduate physics.

**ASTR 5740-3. Interstellar Astrophysics.** Highlights structure, dynamics, and ecology of the interstellar medium, stressing the physical mechanisms that govern the thermal, ionization, and dynamic state of the gas and dust; obser-

variations at all wavelengths; star formation; and relation to external galaxies. Prereq., ASTR 5110 or instructor consent.

**ASTR 5760-3. Astrophysical Instrumentation.** Covers the fundamentals underlying the design, construction, and use of instrumentation used for astrophysical research ranging from radio-wavelengths to gamma rays. Topics include Fourier transforms and their applications, optical design concepts, incoherent and coherent signal detection, electronics and applications, and signal acquisition and processing. Prereq., undergraduate physics.

**ASTR 5770-3. Cosmology.** Studies the smooth universe, including Friedmann-Robertson-Walker metric, Friedmann equations, cosmological parameters, inflation, primordial nucleosynthesis, recombination, and cosmic microwave background. Also studies the lumpy universe, including linear growth of fluctuations, power spectra of CMB and galaxies, dark matter, and large scale flows. Covers galaxy formation and intergalactic medium. Prereq., undergraduate physics, graduate standing, or instructor consent.

**ASTR 5800-3. Planetary Surfaces and Interiors.** Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors, and the integrated geologic histories of the terrestrial planets and satellites. Prereq., graduate standing in physical sciences or instructor consent. Same as GEOL 5800.

**ASTR 5810-3. Planetary Atmospheres.** Covers the structure, composition, and dynamics of planetary atmospheres. Includes the origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres—past and future. Prereq., graduate standing in physical sciences or instructor consent. Same as ATOC 5810 and GEOL 5810.

**ASTR 5820-3. Origin and Evolution of Planetary Systems.** Considers the origin and evolution of planetary systems, including proto-planetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings, and extrasolar planets. Applies celestial mechanics to the dynamical evolution of solar system bodies. Prereq., graduate standing in physical sciences or instructor consent. Same as GEOL/ATOC 5820.

**ASTR 5830-3. Topics in Planetary Science.** Examines current topics in planetary science, based on recent discoveries, spacecraft observations, and other developments. Focuses on a specific topic each time the course is offered, such as Mars, Venus, Galilean satellites, exobiology, comets, or extrasolar planets. May be taken twice for credit. Prereq., graduate standing in physical sciences or instructor consent. Same as ATOC 5830 and GEOL 5830.

**ASTR 5835-1. Seminar in Planetary Science.** May be repeated up to 4 total credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent; undergraduate physics. Same as ATOC/GEOL 5835.

**ASTR 5920 (1-6). Reading and Research in Astrophysical and Planetary Sciences.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 6000-1. Seminar in Astrophysics.** Studies current research and research literature on an astrophysical topic. Students and faculty give presentations. Subjects vary each semester. May be repeated for a total of 4 credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent.

**ASTR 6610-3. Earth and Planetary Physics 1.** Examines mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Other topics include inversion of seismic data for the structure, composition, and state of the interior of the Earth. Same as GEOL 6610 and PHYS 6610.

**ASTR 6620-3. Earth and Planetary Physics 2.** Covers space and surface geodetic techniques as well as potential theory. Other topics are the definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; and tides and the rotation of the Earth. Same as GEOL 6620 and PHYS 6620.

**ASTR 6630-3. Earth and Planetary Physics 3.** Examines the solar system, emphasizing theories of its origin and meteorites. Highlights distribution of radioactive materials, age dating, heat flow through continents and the ocean floor, internal temperature distribution in the Earth, and mantle convection.

Also covers the origin of the oceans and atmosphere. Same as GEOL 6630 and PHYS 6630.

**ASTR 6650 (1-3). Seminar in Geophysics.** Advanced seminar studies in geophysical subjects for graduate students. Same as GEOL 6650 and PHYS 6650.

**ASTR 6940 (1-3). Master's Degree Candidate.**

**ASTR 6950 (1-6). Master's Thesis.**

**ASTR 7500 (1-3). Special Topics in Astrophysical and Planetary Sciences.** Acquaints students with current research in astrophysical and planetary sciences. (Topics vary each semester.) May be repeated up to 9 total credit hours.

**ASTR 7920 (1-6). Reading and Research in Astrophysical and Planetary Sciences.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ASTR 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Atmospheric and Oceanic Sciences

**ATOC 1050-3. Weather and the Atmosphere.** Introduces principles of modern meteorology for nonscience majors, with emphasis on scientific and human issues associated with severe weather events. Includes description, methods of prediction, and impacts of blizzards, hurricanes, thunderstorms, tornadoes, lightning, floods, and firestorms. Meets MAPS requirement for natural science: non-lab. Approved for arts and sciences core curriculum: natural science.

**ATOC 1060-3. Our Changing Environment: El Niño, Ozone, and Climate.** Discusses the Earth's climate for nonscience majors, focusing on the role of the atmosphere, oceans, and land surface. Describes the water cycle, atmospheric circulations, and ocean currents, and how they influence global climate, El Niño, and the ozone hole. Discusses human impacts from climate change. Prereq., ATOC 1050. Approved for arts and sciences core curriculum: natural science.

**ATOC 1070-1. Weather and the Atmosphere Laboratory.** Optional laboratory for ATOC 1050. Laboratory experiments illustrate fundamentals of meteorology. Covers collection, analysis, and discussion of data related to local weather. Uses computers for retrieval and interpretation of weather data from Colorado and across the U.S. Prereq. or coreq., ATOC 1050 or instructor consent. Approved for arts and sciences core curriculum: natural science.

**ATOC 3070-3. Introduction to Oceanography.** Investigates the broad-scale features and dynamics of the Earth's oceans. The course is roughly divided amongst the four major, interrelated disciplines of oceanography: marine geology, marine chemistry, physical oceanography (i.e. circulation), and marine biology. Specific topics include seafloor spreading, marine sediments, salinity, biogeochemical cycles, currents, waves, tides, primary production, marine ecology, marine resources, global warming, and much more. Prereq., any two-course sequence of natural science courses. Same as GEOL 3070. Approved for arts and sciences core curriculum: natural science.

**ATOC 3180-3. Aviation Meteorology.** Familiarizes students with a wide range of atmospheric behavior pertinent to air travel: rudiments of aerodynamics; aircraft stability and control; atmospheric circulation, vertical motion, turbulence, and wind shear; fronts, clouds, and storms. Prereq., ATOC 1050 or equivalent. Approved for arts and sciences core curriculum: natural science.

**ATOC 3300-3. Analysis of Climate and Weather Observations.** Discusses instruments, techniques, and statistical methods used in atmospheric observations. Covers issues of data accuracy and analysis of weather maps. Provides application to temperature and precipitation records, weather forecasting, and climate change trends. Uses computers to access data sets and process data. Prereqs., ATOC 1050 and 1060, or ATOC 3600/GEOG 3601/ENVS 3600, or GEOG 1001 and 1-semester calculus. Same as GEOG 3301. Approved for arts and sciences core curriculum: natural science.

**ATOC 3500-3. Air Chemistry and Pollution.** Examines the composition of the atmosphere, and sources of gaseous and particulate pollutants: their chemis-

try, transport, and removal from the atmosphere. Applies general principles to acid rain, smog, and stratospheric ozone depletion. Prereqs., two semesters of chemistry. Approved for arts and sciences core curriculum: natural science.

**ATOC 3600-3. Principles of Climate.** Describes the basic components of the climate system: the atmosphere, ocean, cryosphere, and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system. Covers the hydrological cycle and its role in climate, climate stability, and global change. Includes forecasting climate and its application and human dimensions. Prereqs., ATOC 1050 and 1060, or ATOC 3300/GEOG 3301, or GEOG 1001 and 1-semester calculus. Same as GEOG 3601/ENVS 3600. Approved for arts and sciences core curriculum: natural science.

**ATOC 3720-3. Planets and Their Atmospheres.** Explores the physics and chemistry of the atmospheres of Mars, Venus, Jupiter, Saturn, and Titan. Examines evolution of the atmospheres of Earth, Venus, and Mars; and the escape of gases from the Galilean satellites, Titan and Mars; the orbital characteristics of moons, planets, and comets. Uses recent results of space exploration. Elective for APS major and minor. Prereq., PHYS 1110-1120, and either MATH 1300-2300, or APPM 1350-1360, or instructor consent. Same as ASTR 3720.

**ATOC 4215-3. Descriptive Physical Oceanography.** Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems. Restricted to seniors. Same as ATOC 5215 and ASEN 4215.

**ATOC 4500 (1-3). Special Topics in Atmospheric and Oceanic Sciences.** Acquaints students with current research in atmospheres, oceans, and climate. Topics may vary each semester. May be repeated up to 9 total credit hours.

**ATOC 4720-3. Introduction to Atmospheric Physics and Dynamics.** Introduces the fundamental physical principles that govern the atmosphere, and provides an elementary description and interpretation of a wide range of atmospheric phenomena. Topics include atmospheric structure and composition, electromagnetic radiation, clouds, precipitation, energy balance, atmospheric motion, and climate. Prereqs., one year of calculus and one year of physics with calculus.

**ATOC 4750-3. Desert Meteorology and Climate.** Introduces students to the dynamic causes of deserts in the context of atmospheric processes and land-surface physics. Discusses desert severe weather, desert microclimates, human impacts and desertification, inter-annual variability in aridity (drought), the effects of deserts on global climate, and the impact of desert climate on humans. Prereq., ATOC 1050 or equivalent. Same as ATOC 5750. Approved for arts and sciences core curriculum: natural sciences.

**ATOC 4800-3. Policy Implications of Climate Controversies.** Examines controversial issues related to the environment, including climate change. Covers scientific theories and the intersection between science and governmental policy. Includes discussion, debate, and critical reading of textual materials. Prereqs., ATOC 1060 or 3600. Credit not granted for this course and ATOC 5000. Approved for arts and sciences core curriculum: critical thinking.

**ATOC 4900 (1-3). Independent Study.** May be repeated up to 6 total credit hours. Prereq., instructor consent.

**ATOC 4950 (1-3). Honors Thesis.** Students work independently on a research topic under the guidance of a faculty member. A written thesis and an oral presentation of the work are required. Registration by arrangement and with consent of faculty mentor. Prereq., junior or senior standing, and minimum 3.00 GPA.

**ATOC 5000-3. Critical Issues in Climate and the Environment.** Discusses current issues such as ozone depletion, global warming, and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments, and critically evaluate these issues. Same as ENVS 5830. Credit not granted for this course and ATOC 4800.

**ATOC 5050-3. Introduction to Atmospheric Dynamics.** Covers atmospheric motion and its underlying mathematical and physical principles. Explores the dynamics of the atmosphere and the mathematical laws governing atmo-

spheric motion. Topics include atmospheric composition and thermodynamics, conservation laws, geostrophic balance, vorticity dynamics, boundary layers, and baroclinic instability. ATOC graduate core course.

**ATOC 5051-3. Introduction to Physical Oceanography.** Provides fundamental knowledge of the basic dynamics, thermodynamics, and mixing processes of the ocean. Prereq., basic algebra and calculus. ATOC graduate core course.

**ATOC 5060-3. Dynamics of the Atmosphere.** Examines large-scale motions in a stratified rotating atmosphere, and quasi-geostrophic flow, barotropic and baroclinic instabilities, cyclogenesis, global circulations, and boundary layer processes. Ageostrophic motions, including Kelvin waves, internal gravity waves, and the theory of frontogenesis are also considered. Prereq., ATOC 5050 or equivalent. ATOC graduate core course.

**ATOC 5061-3. Dynamics of Oceans.** Explores theories of the large-scale ocean, including quasigeostrophic, planetary geostrophic, and shallow water equations. Topics may vary to focus on ocean climate (e.g. thermocline, westward intensification), ocean waves (e.g. gravity, Rossby, and Kelvin), or ocean models (toy, analytic, and numerical). May be repeated up to 9 total credit hours. Prereqs., ATOC 5400 and ATOC 5051 or 5060 or equivalent.

**ATOC 5151-3. Atmospheric Chemistry.** Reviews basic kinetics and photochemistry of atmospheric species and stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidation capacity of the atmosphere, and global climate change. Prereq., graduate standing or instructor consent. ATOC graduate core course. Same as CHEM 5151.

**ATOC 5215-3. Descriptive Physical Oceanography.** Same as ATOC 4215 and ASEN 5215.

**ATOC 5220-3. Nonlinear Dynamics.** Explores conservative systems: canonical perturbation theory, adiabatic invariants, surface of section, overlap criterion, orbit stability, quasilinear diffusion, renormalization analysis of transition to chaos, and bifurcation theory: center manifolds, normal forms, singularity theory. Dissipative systems: strange attractors, renormalization analysis of period doubling, intermittency. Prereq., PHYS 5210 or instructor consent. Same as PHYS 5220.

**ATOC 5235-3. Introduction to Atmospheric Radiative Transfer and Remote Sensing.** Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget. ATOC graduate core course. Same as ASEN 5235.

**ATOC 5400-3. Introduction to Fluid Dynamics.** Covers equations of fluid motion relevant to planetary atmospheres and oceans, and stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers, and wave motions. Introduces instability theory, nonlinear equilibration, and computational methods in fluid dynamics. Prereq., partial differential equations or equivalent. Same as ASTR 5400.

**ATOC 5410-3. Fluid Instabilities, Waves, and Turbulence.** Nonlinear waves and instabilities; wave-mean and wave-wave interactions, resonant triads; secondary instability and transition to turbulence; diagnosis, modeling, and parameterization of turbulent flows in geophysics and astrophysics. Prereq., ASTR 5120, ATOC 5060, or 5400. Same as ASTR 5410.

**ATOC 5540-3. Mathematical Methods.** Applied mathematics course; provides necessary analytical background for courses in plasma physics, fluid dynamics, electromagnetism, and radiative transfer. Covers integration techniques, linear and nonlinear differential equations, WKB and Fourier transform methods, adiabatic invariants, partial differential equations, integral equations, and integrodifferential equations. Same as ASTR 5540.

**ATOC 5560-3. Radiative Processes in Planetary Atmospheres.** Application of radiative transfer theory to problems in planetary atmospheres, with primary emphasis on the Earth's atmosphere; principles of atomic and molecular spectroscopy; infrared band representation; absorption and emission of atmospheric gases; radiation flux and flux divergence computations; radiative transfer and fluid motions; additional applications such as the greenhouse

effect, inversion methods and climate models. Recommended prereq., ATOC 5235. Same as ASTR 5560.

**ATOC 5600-3. Physics and Chemistry of Clouds and Aerosols.** Clouds and aerosols are ubiquitous in planetary atmospheres, where they impact climate, atmospheric chemistry, remote sensing, and weather. Applies basic microphysical, radiative, and chemical processes affecting particles to issues in current literature. ATOC graduate core course.

**ATOC 5750-3. Desert Meteorology and Climate.** Same as ATOC 4750.

**ATOC 5760-3. Astrophysical Instrumentation.** Covers the fundamentals underlying the design, construction, and use of instrumentation used for astrophysical research ranging from radio-wavelengths to gamma rays. Topics include: Fourier transforms and their applications; optical design concepts; incoherent and coherent signal detection; electronics and applications; signal acquisition and processing. Prereq., graduate standing.

**ATOC 5810-3. Planetary Atmospheres.** Covers the structure, composition, and dynamics of planetary atmospheres. Also includes origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres past and future. Prereq., graduate standing in a physical science, or instructor consent. Same as ASTR/GEOL 5810.

**ATOC 5820-3. Origin and Evolution of Planetary Systems.** Reviews protoplanetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets and asteroids, planetary rings, and extrasolar planets. Applies celestial mechanics to the orbital evolution of solar system bodies. Prereq., graduate standing in a physical science, or instructor consent. Same as ASTR 5820 and GEOL 5820.

**ATOC 5830-3. Topics in Planetary Science.** Covers current topics in planetary science based on recent discoveries, spacecraft observations, or other developments. Focuses on a specific topic such as Mars, Venus, Galilean satellites, exobiology, comets, or extrasolar planets. May be repeated up to 6 total credit hours, provided the topics vary. Prereq., graduate standing in physical sciences, or instructor consent. Same as ASTR 5830 and GEOL 5830.

**ATOC 5835-1. Seminar in Planetary Science.** Studies current research on a topic in planetary science. Subjects may vary each semester. May be repeated up to 4 total credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent. Same as ASTR 5835 and GEOL 5835.

**ATOC 5900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Students may register for more than one section of this course in the same semester. Prereq., instructor consent.

**ATOC 6020-1. Seminar in Atmospheric and Oceanic Sciences.** Studies an area of current research in the atmospheric and oceanic sciences. Students read selected papers from the literature. Students and faculty give presentations and participate in discussions. May be repeated for a total of 6 credit hours within the degree. May be repeated for a total of 3 credit hours within a semester. Prereq., graduate standing and instructor consent.

**ATOC 6100-3. Predicting Weather and Climate.** Discusses background theory and procedures used in weather and climate prediction on a variety of space and time scales. Includes the forecasting of weather on time scales of days; error growth in numerical models; prediction of El Niño and monsoon variability; and prediction of the impact of anthropogenic influences on climate. Consists of lectures and a weekly laboratory. Prereq., ATOC 5060, 5061, or instructor consent.

**ATOC 6950 (1-6). Master's Thesis.**

**ATOC 7500 (1-3). Special Topics in Atmospheric and Oceanic Sciences.** Acquaints students with current research in atmospheres, oceans, and climate. Topics may vary each semester. May be repeated up to 9 total credit hours. Students may register for more than one section of this course in the same semester.

**ATOC 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Baker Residential Academic Program

**BAKR 1500-3. Colorado: History, Ecology, and Environment.** Studies the Colorado environment from multiple aspects of history and ecology. Presents historical events in their environmental context and examines lingering environmental consequences. Presents major habitats within Colorado and relates their historical and present uses. Lecture and field trips. Approved for arts and sciences core curriculum: United States context.

**BAKR 1600-3. Creating A Sustainable Future.** Explores opportunities for moving toward a sustainable 21st century U.S. society. Evaluates socio-economic institutions, values and forces in late 20th century U.S. society that are unsustainable, given 21st century environmental, economic and social challenges. Contemplates societal progress from reflective perspectives and leading visionaries, including CU-generated documents. Explores actions you can adopt now that empower you to live a more sustainable lifestyle. Approved for arts and sciences core curriculum: contemporary societies.

## Biological Sciences

See *Ecology and Evolutionary Biology; Molecular, Cellular, and Developmental Biology; and Integrative Physiology.*

## Central and East European Studies

**CEES 2002-3. Introduction to Central and East European Studies.** Examines major themes in the history of Russia and East-Central Europe since the early modern era, introduces the literature and arts of the region, and presents current political, social, and economic issues. Same as HIST 2002. Approved for arts and sciences core curriculum: historical context.

## Chemistry and Biochemistry

**CHEM 1011-3. Environmental Chemistry 1.** Lect. Introduces basic principles of chemistry with applications to current environmental issues including toxic chemicals, air and water pollution, energy sources and their environmental impact, and climate change resulting from the greenhouse effect. No credit given to chemistry or biochemistry majors for CHEM 1011 if students already have credit in any college-level chemistry course numbered 1113/1114 (formerly 1111) or higher. Meets MAPS requirements for natural sciences: chemistry or physics. Approved for arts and sciences core curriculum: natural science.

**CHEM 1021-4. Introductory Chemistry.** Lect., rec., and lab. For students with no high school chemistry or a very weak chemistry background. Remedies a deficiency in natural science MAPS requirements and prepares students for CHEM 1113/1114. No credit given to chemistry or biochemistry majors for CHEM 1021 if students already have credit in any college-level chemistry course numbered 1113/1114 (formerly 1111) or higher. Prereq., one year high school algebra or concurrently enrollment in MATH 1011. Approved for arts and sciences core curriculum: natural science.

**CHEM 1031-4. Environmental Chemistry 2.** Lect., rec., and lab. Applications of chemical principles to current environmental issues including acid rain, stratospheric ozone depletion, the Antarctic ozone hole, solar energy conversion and fuel cells, and the environmental consequences of nuclear war. Laboratory experience is included. No credit given to chemistry or biochemistry majors for 1031 if students already have credit in any college-level chemistry course numbered 1113/1114 (formerly 1111) or higher. Prereq., CHEM 1011 with a grade of C- or higher. Approved for arts and sciences core curriculum: natural science.

**CHEM 1113-4. General Chemistry 1.** Lect., rec. Intended for first-semester students whose academic plans require advanced work in chemistry. Subjects: components of matter, stoichiometry, classes of reactions, gases, thermochemistry, atomic structure, electron configuration, chemical bonding, molecular shapes, covalent bonding, organic compounds, intermolecular forces, equilibrium. Prereqs., one year high school chemistry or CHEM 1021 (min. grade C-); high school math through pre-calculus. Not recommended for

students with grades below B- in CHEM 1021. Coreq., CHEM 1114. Not open to engineering students with exception of EPEN majors. Credit not granted for this course and CHEM 1111, 1251, 1351, or CHEM 1221/CHEM 1211. Approved for arts and sciences core curriculum: natural science.

**CHEM 1114-1. Laboratory in General Chemistry 1.** Lab. Intended for first-semester students whose academic plans require advanced work in chemistry. Instruction in experimental techniques which coordinate with lecture topics in CHEM 1113. Prereqs., one year high school chemistry or CHEM 1021 (min. grade C-); high school math through pre-calculus. Not recommended for students with grades below B- in CHEM 1021. Coreq., CHEM 1113. Not open to engineering students with exception of EPEN majors. Credit not granted for this course and CHEM 1111, 1251, 1351, or CHEM 1221/CHEM 1211. Approved for arts and sciences core curriculum: natural science.

**CHEM 1133-4. General Chemistry 2.** Lect., rec. Intended for second-semester students whose academic plans require advanced work in chemistry. Subjects: acid-base equilibria, buffers and titrations, thermodynamics, redox reactions, electrochemistry, transition elements and their coordination compounds, solubility/solubility equilibria, crystal field theory, kinetics, nuclear chemistry. Prereq., CHEM 1113/1114 or equivalent (min. grade C-). Coreq., CHEM 1134. Credit not granted for this course and CHEM 1131, 1271 or 1371. Approved for arts and sciences core curriculum: natural science.

**CHEM 1134-1. Laboratory in General Chemistry 2.** Lab. Intended for second-semester students whose academic plans require advanced work in chemistry. Instruction in experimental techniques which coordinate with lecture topics in CHEM 1133. Prereq., CHEM 1113/1114 or equivalent (min. grade C-). Coreq., CHEM 1133. Credit not granted for this course and CHEM 1131, 1271, or 1371. Approved for arts and sciences core curriculum: natural science.

**CHEM 1221-2. Engineering General Chemistry Lab.** Coreq., CHEN 1211. One hour recitation in which concepts and problems are re-emphasized, homework is collected, and quizzes are given. Three hour lab in which students perform experiments designed to illustrate chemical concepts discussed in CHEN 1211. Also introduction to basic techniques in chemical measurements and synthesis. Prereq., one year high school chemistry or CHEM 1001 or 1021 (min. grade C-); high school algebra. Coreq., CHEN 1211. Credit not granted for this course and CHEM 1111, 1113/1114, 1251, or 1351.

**CHEM 1251-5. General Chemistry 1 for Chemistry and Biochemistry Majors.** Lect., rec., lab. Intended for first-semester CHEM/BCHM majors. Subjects: components of matter, stoichiometry, classes of reactions, gases, thermochemistry, atomic structure, electron configuration, chemical bonding, molecular shapes, covalent bonding, organic compounds, intermolecular forces, equilibrium. Prereqs., one year high school chemistry or CHEM 1021 (min. grade C-); high school math through pre-calculus. Not recommended for students with grade below B- in CHEM 1021. Restricted to CHEM/BCHM majors. Credit not granted for this course and CHEM 1111, 1113/1114, CHEM 1351, or CHEN 1211/ CHEM 1221. Approved for arts and sciences core curriculum: natural science.

**CHEM 1271-5. General Chemistry 2 for Chemistry and Biochemistry Majors.** Lect., rec., lab. Intended for second-semester CHEM/BCHM majors. Subjects: acid-base equilibria, buffers and titrations, thermodynamics, redox reactions, electrochemistry, transition elements and their coordination compounds, solubility/solubility equilibria, crystal field theory, kinetics, nuclear chemistry. Prereq., CHEM 1251 or equivalent (minimum grade C-). Restricted to CHEM/BCHM majors. Credit not granted for this course and CHEM 1131, 1133/1134 or CHEM 1371. Approved for arts and sciences core curriculum: natural science.

**CHEM 1351-5. Honors General Chemistry 1.** Lect., rec., and lab. Principles of chemistry and their applications are covered in a comprehensive manner (honors level) in this low-enrollment freshman course. Lectures include topics not covered in CHEM 1113/1114-1133/1134. The laboratory experience is more extensive; therefore, the CHEM 1351-1371 sequence is highly recommended for well-prepared students who intend to major in chemistry, chemical engineering, physics, molecular biology, or related areas. Prereqs., one year high school chemistry; four years of high school math and/or a high score on the SAT or ACT math exam and one year of high school physics. Credit not granted for this course and CHEM 1111, 1113/1114, 1221, 1251, and CHEN 1211. Approved for arts and sciences core curriculum: natural science.

**CHEM 1371-5. Honors General Chemistry 2.** Lect., rec., and lab. Continuation of CHEM 1351. Prereq., CHEM 1351 (min. grade C-). Credit not granted for this course and CHEM 1131, 1133/1134 or CHEM 1271. Approved for arts and sciences core curriculum: natural science.

**CHEM 3311-4. Organic Chemistry 1.** Lect. and rec. Intended primarily for nonmajors. Topics include structure and reactions of alkanes, alkenes, alkynes, alkyl halides, and aromatic molecules; nomenclature of organic compounds; stereochemistry; reaction mechanisms and dynamics. Students may receive credit for only one of CHEM 3311 and 3351. Prereqs., CHEM 1133/1134 (formerly CHEM 1131), 1271, or 1371 (min. grade C-) or equivalent; for engineering students only: CHEN 1211 (min. grade C-) or equivalent; coreq., CHEM 3321 or 3361.

**CHEM 3321-1. Laboratory in Organic Chemistry 1.** Lab. Instruction in experimental techniques of modern organic chemistry emphasizing chemical separations and reactions of alkanes, alkenes, and aromatic compounds. Stereochemical modeling and the identification of organic unknowns by spectroscopic and chemical methods are also introduced. Prereqs., CHEM 1131, 1133/1134 (formerly 1131), 1271, 1371, or CHEN 1211 (min. grade C-) or equivalent. Coreq., CHEM 3311 or 3351. For biochemistry and nonchemistry majors. Credit not granted for this course and CHEM 3361.

**CHEM 3331-4. Organic Chemistry 2.** Lect. and rec. Intended primarily for nonmajors. Topics include structure and reactions of alkyl halides, alcohols, ethers, carboxylic acids, aldehydes, ketones, and amines; introduction to the chemistry of heterocycles, carbohydrates, and amino acids; nomenclature of organic compounds; synthesis; and reaction techniques. Prereq., CHEM 3311 or 3351 and CHEM 3321 or 3361 (all min. grade C-). Prereq. or coreq., CHEM 3341 or 3381. Credit not granted for this course and CHEM 3371.

**CHEM 3341-1. Laboratory in Organic Chemistry 2.** Lab. For biochemistry and nonchemistry majors. Instruction in experimental techniques of modern organic chemistry emphasizing reactions involving alcohols, ketones, carboxylic acids, and their derivatives. Multistep syntheses are also introduced. Prereq., CHEM 3321 or 3361 (min. grade C-). Coreq., CHEM 3331 or 3371.

**CHEM 3351-4. Organic Chemistry 1 for Chemistry and Biochemistry Majors.** Lect. and rec. Topics include structure and reactions of alkanes, alkenes, alkynes, alcohols, ethers, aldehydes, ketones, and alkyl halides; nomenclature of organic compounds; stereochemistry; reaction mechanisms. Students may receive credit for only one of CHEM 3311 and 3351. Prereqs., CHEM 1131, 1133/1134, 1271, or 1371 (min. grade C-); coreq., CHEM 3361 or 3321.

**CHEM 3361-2. Laboratory in Organic Chemistry 1 for Chemistry Majors.** Lab. Required course for chemistry majors. Instruction in experimental techniques of modern organic chemistry emphasizing chemical separations and reactions of alkanes, alkenes, alcohols, ketones, and alkyl halides. Explores stereochemical modeling and the identification of organic unknowns. Prereq., CHEM 1131, 1133/1134, 1271, or 1371 (min. grade C-); coreq., CHEM 3351 or 3311. Credit not granted for this course and CHEM 3321.

**CHEM 3371-4. Organic Chemistry 2 for Chemistry and Biochemistry Majors.** Lect. and rec. Topics include structure and reactions of carboxylic acids and derivatives, aromatic compounds, and amines; introduction to the chemistry of heterocycles, carbohydrates, and amino acids; nomenclature of organic compounds; reaction mechanisms. Prereqs., CHEM 3351 or 3311 and CHEM 3361 or 3321 (min. grade C-). Prereq. or coreq., CHEM 3381 or 3341. Credit not granted for this course and CHEM 3331.

**CHEM 3381-2. Laboratory in Organic Chemistry 2 for Chemistry Majors.** Lab. Required course for chemistry majors. Instruction in experimental techniques of modern chemistry, emphasizing reactions involving alcohols, ketones, carboxylic acids, aromatic compounds, and their derivatives. Multistep syntheses are also introduced. Prereqs., CHEM 3321 or 3361 and CHEM 3341 (min. grade C-). Prereq. or coreq., CHEM 3331 or 3371.

**CHEM 4011-3. Modern Inorganic Chemistry.** Lect. Required course for chemistry majors. Introduces modern inorganic chemistry for undergraduates. Includes atomic structure, chemical periodicity, structure and bonding in molecules and crystals, reaction mechanisms, chemistry of selected main group and transition elements, and emphasis on catalyst, materials, bioinorganic, and organometallic systems. Prereq. or coreq., CHEM 4431, 4521, or 4531 (min. grade C-).

**CHEM 4021-3. Inorganic Laboratory.** One lect. and two 3-hour labs per week. Instruction in experimental techniques of modern inorganic chemistry. Includes syntheses and spectroscopic characterizations of transition metal and main group compounds, experience in manipulation of air sensitive compounds, and techniques involving unusual conditions of pressure or temperature. Prereq., CHEM 4011 (min. grade C-).

**CHEM 4171-3. Instrumental Analysis.** Lect. Theory and practice of instrumental methods of chemical analysis including atomic and molecular spectroscopy, gas and liquid chromatography, mass spectrometry, and electrochemistry. Prereqs., CHEM 3331 or 3371 (min. grade C-).

**CHEM 4181-3. Instrumental Analysis Laboratory with Environmental Emphasis.** One lect. and six hours of lab per week. Instruction and experience in using instrumental methods of analysis to address problems in chemistry, biochemistry, industrial chemistry, and environmental chemistry. Prereq., CHEM 4171 (min. grade C-).

**CHEM 4411-3. Physical Chemistry with Biochemistry Applications 1.** Lect. Introduces thermodynamics and kinetics, emphasizing macromolecule and biochemical applications. Includes thermodynamics, chemical and physical equilibria, solution chemistry, transport properties, multiple site binding phenomena, and the rates of chemical and biochemical reactions. Alternative to CHEM 4511. Designed for biochemistry and biology majors. Prereqs., CHEM 3311 or 3351, PHYS 1110 or 2010, MATH 2400 or APPM 2350 (min. grade C-), or instructor consent. Prereq. or coreq., PHYS 1120 or 2020. Credit not granted for this course and CHEM 4511. Same as CHEM 5411.

**CHEM 4431-3. Physical Chemistry with Biochemistry Applications 2.** Lect. Principles of physical chemistry (second semester) for students in the biological sciences. Topics include quantum mechanics, chemical bonds, principles of spectroscopy, statistical mechanics, and transport processes with application to biological systems. Mathematical background (integral and differential calculus including partial differentiation) required. Prereq., grade of C- or higher in CHEM 4411 or 4511, and MATH 2400 or APPM 2350, and PHYS 1120 or 2020, or instructor consent. Credit not granted for this course and CHEM 4531. Same as CHEM 5431.

**CHEM 4511-3. Physical Chemistry 1.** Lect. Chemical thermodynamics and kinetics. Includes study of laws of thermodynamics, thermochemistry, entropy, free energy, chemical potential, chemical equilibria, and the rates and mechanisms of chemical reactions. Prereqs., CHEM 3311 or 3351, MATH 2400 or APPM 2350, and PHYS 1110 (all min. grade C-) or instructor consent. Prereq. or coreq., PHYS 1120. Credit not granted for this course and CHEM 4411/5411.

**CHEM 4521-3. Physical Chemistry for Engineers.** Covers kinetic theory of gases; chemical equilibrium; electrochemistry; chemical kinetics; quantum mechanics and atomic structure; chemical bonding; spectroscopy; statistical mechanics; the solid state; the liquid state; and surface chemistry. Prereq., CHEM 1211 and CHEM 1221, CHEM 1133/1134 (formerly 1111) and 1113/1134 (formerly 1131), or 1371, MATH 2400 or APPM 2350, and PHYS 1110 (min. grade C- required in all) or instructor consent. Prereq. or coreq., PHYS 1120.

**CHEM 4531-3. Physical Chemistry 2.** Lect. Introduces the quantum theory of atoms, molecules and chemical bonding, and statistical thermodynamics. Includes principles of quantum mechanics and their application to atomic structure, molecular spectroscopy, symmetry properties, and the determination of molecular structure. Also includes principles of statistical mechanics and their applications to properties of gases, liquids, and solids. Prereqs., CHEM 4511 or 4411, and PHYS 1120 or 2020, and MATH 2400 or APPM 2350 (min. grade C- required in all). Credit not granted for this course and CHEM 4431 or 5431.

**CHEM 4541-2. Physical Chemistry Laboratory for Engineers.** One lect. and one 3-hour lab per week. Instruction in experimental techniques of modern physical chemistry. Experiments are chosen to illustrate the principles of thermodynamics, chemical kinetics, quantum chemistry, and spectroscopy discussed in CHEM 4521. Prereq. or coreq., CHEM 4521 or 4531.

**CHEM 4581-1. Physical Chemistry Lab 1.** One 3-hour lab per week. Instruction in experimental techniques of modern physical chemistry. Experiments illustrate the fundamental principles of thermodynamics and chemical kinetics. Illustrates the material discussed in CHEM 4511. Prereq. or coreq., CHEM 4411 or 4511 (min. grade C-) or instructor consent. Restricted to CHEM and BCHM majors. Credit not granted for this course and CHEM 4561.

**CHEM 4591-2. Physical Chemistry Lab 2.** One lect. and one 3-hour laboratory every two weeks. A continuation of CHEM 4581, but may be taken concurrently with CHEM 4531 or CHEM 4431. Experiments illustrate the principles of quantum chemistry and spectroscopy discussed in CHEM 4531. Prereq., CHEM 4411 or 4511 and 4581 (min. grade C- in all) or instructor consent. Prereq. or coreq., CHEM 4431 or 4531. Restricted to CHEM and BCHM majors. Credit not granted for this course and CHEM 4561.

**CHEM 4611-3. Survey of Biochemistry.** One-semester survey of the main themes of modern biochemistry: biomolecular structure/function, metabolism, biosynthesis, DNA from genome to proteome, and cellular signaling. For biology and engineering majors and others wanting a survey of biochemistry. Prereq., one semester of organic chemistry (CHEM 3311, 3351, or equivalent; min. grade C-).

**CHEM 4621-3. Genome Databases: Mining and Management.** Develops essential skills for performing genomic analyses, with focus on developing practical research tools. Introduces human genome and microbiome projects, Python/SQL scripting, accessing and understanding genomic data, sequence alignment and search, evolutionary models, expression data, biological networks, and macromolecular structure. Prereqs., MCDB 3500, CSCI 3104, or CHEM 4711; coreq., CSCI 2270. Same as CHEM 5621. Credit not granted for this course and CSCI 4317 or MCDB 4621.

**CHEM 4711-3. General Biochemistry 1.** Lect. Topics include structure, conformation, and properties of proteins, nucleic acids, carbohydrates, and membranes; enzyme mechanisms, kinetics, and regulation; intermediary metabolism; energetics and metabolic control; electron transport and oxidative phosphorylation. Prereq., CHEM 3331 or 3371 (min. grade C-). Same as CHEM 5711.

**CHEM 4731-3. General Biochemistry 2.** Lect. Continuation of CHEM 4711. Metabolism of carbohydrates, lipids, amino acids, and nucleic acids; photosynthesis; biosynthesis and function of macromolecules including DNA, RNA, and proteins; biochemistry of subcellular systems; and special topics. Prereq., CHEM 4711 (min. grade C-). Same as CHEM 5731.

**CHEM 4751-3. Current Topics in Biochemical Research.** Covers current topics in modern biochemical research through lectures, reading recent research articles, critical thinking, and class discussion. Topics include protein and nucleic acid structure and function, biomolecular interactions, enzyme function, and cellular signaling and regulation. Prereqs., CHEM 4711 and 4731 (min. grade C-) or instructor consent. Same as CHEM 5751.

**CHEM 4761-4. Biochemistry Laboratory.** Two 5-hour periods per week. The first hour of each period is lecture, the remainder is laboratory. Introduction to modern biochemical techniques. Topics include enzymology, spectrophotometry, electrophoresis affinity chromatography, radioisotopes, recombinant DNA, and molecular cloning. Prereq., CHEM 4711 (min. grade of C-). Recommended prereq., CHEM 4731 or MCDB 3500. Restricted to CHEM or BIOCHEM majors.

**CHEM 4791-3. Bioorganic Chemistry in Biotechnology.** Explores examples of antibodies, peptides, proteins, RNA, DNA, carbohydrates and lipids. The course uses the primary literature and requires student participation. Prereq., undergraduate or graduate biochemistry and two semesters of organic chemistry. Recommended prereq., undergraduate molecular biology. Same as CHEM 5791.

**CHEM 4901 (1-6). Independent Study in Chemistry and Biochemistry.** For undergraduate study. May be repeated up to 8 total credit hours. Prereq., instructor consent.

**CHEM 5011-3. Advanced Inorganic Chemistry 1.** Lect. Inorganic chemistry based on principles of bonding, structure, reaction mechanisms, and modern synthetic methods. Chemistry and general properties of representative and transition elements and their compounds. Prereqs., CHEM 4011 and 4531, or graduate standing.

**CHEM 5061-3. Advanced Inorganic Chemistry 2.** Lectures in physical inorganic chemistry with an emphasis on topics for understanding modern solar energy conversion to electricity and fuels. Includes a description of bonding and properties of coordination compounds in terms of the ligand field and molecular orbital theories. The primary research literature will be used to motivate exploration of relevant themes including spectroscopy, electron trans-



fer, energy transfer, bioenergetic conversion, and small-molecule activation. Prereqs., CHEM 4011 and graduate standing.

**CHEM 5151-3. Atmospheric Chemistry.** Lect. Basic kinetics and photochemistry of atmospheric species. Stratospheric chemistry with emphasis on processes controlling ozone abundance. Tropospheric chemistry focusing on photochemical smog, acid deposition, oxidative capacity of the atmosphere, and global climate change. Prereq., graduate standing or instructor consent. Same as ATOC 5151.

**CHEM 5161-3. Analytical Spectroscopy.** Lect. Special topics in spectrochemical analysis, including atomic and molecular spectroscopy, laser analytical methods, electron spectroscopy, surface analytical methods, and their applications to environmental, atmospheric, and bioanalytical problems. Prereq., undergraduate physical chemistry or instructor consent.

**CHEM 5171-3. Electroanalytical Chemistry.** Lect. Establishes a background for understanding electrochemical systems through a review of the relevant thermodynamic, kinetic, and electronic principles. Compares classical and modern electrochemical methods of analysis. Several special topics are discussed in depth. Prereq., undergraduate physical chemistry or instructor consent.

**CHEM 5181-3. Mass Spectrometry and Chromatography.** Mass spectrometry, including instrumentation, ionization techniques, and interpretation of mass spectra. Analytical separation processes, with special reference to the theory and practice of liquid and gas chromatography. Combined techniques (e.g., GC-MS), and applications. Prereq., undergraduate physical chemistry or instructor consent.

**CHEM 5201-3. Atmospheric Aerosol Discussions.** Discusses recent literature concerning atmospheric aerosols and their role in atmospheric problems, including global ozone depletion, air quality, regional haze, acid rain, and global climate change. May be repeated up to 12 total credit hours. Recommended prereq., CHEM/ATOC 5151. Restricted to graduate students.

**CHEM 5311-3. Advanced Synthetic Organic Chemistry.** Lect. Surveys synthetic transformations emphasizing important functional group transformations and carbon-carbon, bond-forming reactions. Required of all organic chemistry graduate students. Prereq., one year of organic chemistry.

**CHEM 5321-3. Advanced Physical Organic Chemistry.** Lect. Modern concepts of physical organic chemistry and their use in interpreting data in terms of mechanisms of organic reactions and reactivities of organic compounds. Required of all organic chemistry graduate students. Prereqs., one year of organic chemistry and one year of physical chemistry.

**CHEM 5331 (2-3). Advanced Spectroscopic Techniques in Organic Chemistry.** Lect. Advanced spectroscopic techniques for structure and determination in organic chemistry. Emphasizes proton and carbon-13 NMR spectroscopy. Prereqs., one year of organic chemistry and one year of physical chemistry.

**CHEM 5341-3. Chemical Biology and Drug Design.** Develop knowledge base and skills in the interdisciplinary field of chemical biology, including aspects of chemistry and biology, and integrating both with respect to hierarchical levels of structure (atomic, molecular, cellular). Students will receive training that helps to develop their careers in biotech, pharmaceutical, and other research-oriented industries as well as in academia. Prereqs., introductory organic chemistry and general biochemistry.

**CHEM 5411-3. Physical Chemistry with Biochemistry Applications 1.** Lect. Introduces thermodynamics and kinetics, emphasizing macromolecules and biochemical applications. Intended for biology graduate students. Not open to students in chemistry or other physical sciences. Prereqs., three semesters of calculus, one year of physics, and instructor consent or graduate standing. Same as CHEM 4411. Credit not granted for this course and CHEM 4411 or CHEM 4511.

**CHEM 5431-3. Physical Chemistry with Biochemistry Applications 2.** Lect. Principles of physical chemistry (second semester) for graduate students in biology. Not open to students of chemistry or the physical sciences. Prereqs., graduate standing and CHEM 4411, or instructor consent. Credit not granted for this course and CHEM 4531. Same as CHEM 4531.

**CHEM 5531-3. Statistical Mechanics.** Lect. Fundamental concepts of quantum and classical statistical mechanics. Applications to properties of gases,

liquids, solids, spin, and polymer systems. Reaction, fluctuation, nucleation, and relaxation phenomena. Prereq., undergraduate physical chemistry.

**CHEM 5541-3. Chemical Dynamics.** Lect. Discussion of mechanism and rate of chemical reactions from a fundamental point of view. Discusses nature of collision and develops concepts of cross section and rate constant. Theories of elementary bimolecular and decay processes are critically examined. Prereq., undergraduate physical chemistry.

**CHEM 5561-3. Methods of Molecular Biophysics.** Discusses techniques used to determine structure, function, and dynamics of macromolecules, including optical spectroscopy, magnetic resonance, diffraction, and electron microscopy. Approved for credit toward molecular biophysics certificate. Prereq., one year physical chemistry or quantum mechanics with graduate standing or instructor consent.

**CHEM 5571-3. Surface Science.** Lect. Principles of surface science with emphasis on fundamental surface phenomena, surface techniques, and surface chemistry. Basic description of surfaces, adsorbate-surface interactions, surface kinetics, and methods of surface analysis. Surface science of interactions, surface kinetics, and methods of surface analysis. Surface science of heterogeneous catalysis, semiconductor processing, and environmental interfaces. Prereqs., undergraduate physical chemistry and graduate standing or instructor consent.

**CHEM 5581-3. Introductory Quantum Chemistry.** Lect. Basic principles and techniques of quantum mechanics with applications to questions of chemical interest. Quantum dynamics of atoms, molecules, and spin; electronic structure of atoms and molecules. Prereqs., two semesters of physical chemistry and graduate standing, or instructor consent.

**CHEM 5591-3. Advanced Molecular Spectroscopy.** Lect. Rotational, vibrational, and electronic spectra of molecules, and their interpretation in terms of the quantum theory of molecular structure. Prereqs., two semesters of physical chemistry and graduate standing, or instructor consent.

**CHEM 5621-3. Genome Databases: Mining and Management.** Same as CHEM 4621. Credit not granted for this course and CSCI 5317 or MCDB 5621.

**CHEM 5661-3. Advances in Molecular Biophysics.** Discuss recent literature concerning biophysical studies of macromolecular structure and mechanism, including DNA, RNA, proteins, and their interactions. Approved for credit toward Molecular Biophysics Certificate. Prereqs., one year of physical chemistry or quantum mechanics, one year of biology, graduate standing, or instructor consent.

**CHEM 5711-3. General Biochemistry 1.** Lect. Same lectures as CHEM 4711. Course work includes library studies and preparation of special reports. Not open to undergraduates. Prereq., one year of organic chemistry and graduate standing.

**CHEM 5731-3. General Biochemistry 2.** Lect. Same lectures as CHEM 4731. Course work includes library studies and report preparations. Not open to undergraduates. Prereqs., CHEM 5711 and graduate standing, or instructor consent.

**CHEM 5751-3. Current Topics in Biochemical Research.** Prereq., instructor consent required. Same as CHEM 4751.

**CHEM 5771-5. Advanced General Biochemistry 1.** Lect. In-depth analysis of DNA structure and replication, RNA synthesis and processing, protein synthesis, enzyme function and mechanism, protein structure, protein dynamics, and physical chemistry of macromolecules. Intended as a comprehensive treatment of areas central to modern biochemistry for entering graduate students. Prereq., CHEM 4731 or equivalent, and graduate standing, or instructor consent.

**CHEM 5776-1. Scientific Ethics and Responsible Conduct in Research.** Lect. Advanced discussion of topics in scientific ethics, including requirements for responsible conduct of research, case histories of fraud, research misconduct, ethical misconduct, and development of professional values and ethical standards. Prereqs., CHEM 5771 or MCDB 5210 taken concurrently, and instructor consent. Same as MCDB 5776.

**CHEM 5781-5. Advanced General Biochemistry 2.** Lect. Detailed consideration of contemporary topics in biochemistry, including protein structure (primary, secondary, tertiary, and quaternary), methods of structure determina-

tion and prediction, protein folding (kinetics, thermodynamics, denaturation, and renaturation), and protein dynamics (internal motions and methods of analysis). Prereq., CHEM 5771 or instructor consent.

**CHEM 5791-3. Bioorganic Chemistry in Biotechnology.** Same as CHEM 4791.

**CHEM 5801-3. Advanced Signal Transduction and Cell Cycle Regulation.**

Lect. Advanced discussion of current research and literature in signal transduction, including ligands, receptors, and intracellular signaling pathways, as well as control on transcription, chromatin structure, DNA replication, mitosis, and cell cycle progression. Recommended prereqs., CHEM 5771 and 5781, MCDB 5210 or MCDB 5220, and graduate standing.

**CHEM 5811-3. Advanced Methods in Protein Sequencing and Analysis.** Lect.

Advanced discussion of current methods in protein sequencing, sequence analysis, and posttranslational modifications, emphasizing techniques of mass spectrometry, use of protein databases, sequence alignment and motifs, structure prediction, and modeling of signaling pathways. Prereq., instructor consent. Recommended prereqs., CHEM 5771, CHEM 5781, MCDB 5210, and graduate standing.

**CHEM 5821-1. Special Topics in Signaling and Cell Regulation.** Lect. Reviews

and evaluates literature on subjects of current interest in signal transduction transcription, cell cycle progression, and cell regulation. Primarily for graduate level presentation of special topics by students, faculty, and research staff. May be repeated up to 5 total credit hours. Prereqs., graduate standing and instructor consent.

**CHEM 6001-1. Seminar: Inorganic Chemistry.** Student, faculty, and guest

presentations and discussions of current research in inorganic chemistry and related topics (transition element and main group element compound properties, inorganic compound in biological, industrial, and materials applications). Required of all inorganic chemistry graduate students. Credit deferred until presentation of satisfactory seminar. Prereq., graduate standing or instructor consent.

**CHEM 6021 (1-3). Special Topics in Inorganic Chemistry.** Lect. Subjects of

current interest in inorganic chemistry. Primarily used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule. May be repeated up to 7 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 6031-3. Special Topics in NanoScience.** Introduces the synthesis,

physical properties, and applications of nanometer-scale materials and devices. Includes synthesis of metal and semiconductor nanoparticles and nanowires, optical and electronic properties of nanoscale systems, and applications in biotechnology and energy. Prereqs., CHEM 1111, 1131, and 4431 or 4521 or 4511.

**CHEM 6101-1. Seminar: Analytical Chemistry.** Student, faculty, and guest

presentations and discussions of current research in analytical chemistry. Required of all analytical chemistry graduate students. Credit deferred until presentation of satisfactory seminar. Prereq., graduate standing or instructor consent.

**CHEM 6111 (1-3). Special Topics in Analytical Chemistry.** Lect. Subjects of

current interest in analytical chemistry. Used for graduate-level presentations of special topics by visiting and resident faculty. Variable class schedule. May be repeated up to 7 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 6301 (1-3). Seminar in Organic Chemistry.** Discussions principally

concerned with recent literature in organic chemistry. Required of all organic chemistry graduate students. Prereq., graduate standing or instructor consent.

**CHEM 6311 (1-3). Special Topics in Synthetic Organic Chemistry.** Lect. Se-

lected topics in synthetic organic chemistry, encompassing both methods and/or total synthesis of complex molecules. Prereqs., CHEM 5311 and graduate standing, or instructor consent.

**CHEM 6321 (1-3). Special Topics in Physical Organic Chemistry.** Lect. Se-

lected topics in physical organic chemistry, which may include photochemistry, carbene chemistry, free radical chemistry, molecular orbital methods, organic materials, or gas phase ion chemistry. Prereq., CHEM 5321 and graduate standing or instructor consent.

**CHEM 6401 (1-3). Seminar: Physical Chemistry.** Student, faculty, and guest presentations of current research in physical chemistry. Discussion of research topics related to the subject of weekly physical chemistry/chemical physics seminar and appropriate journal articles. Prereq., graduate standing or instructor consent.

**CHEM 6411 (1-3). Advanced Topics in Physical Chemistry.** Lect. May be

repeated up to 7 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 6601-1. Biochemistry Seminar.** Required of all biochemistry graduate

students. Credit is deferred until presentation of satisfactory seminar. Prereq., graduate standing or instructor consent.

**CHEM 6621-1. Special Topics in RNA.** Reviews and evaluates recent scientific

literature in the field of RNA chemistry and biology, including topics in structure, catalysis, bioinformatic approaches, and control of gene expression. Primarily for graduate level presentation of special topics by students and research staff. May be repeated up to 5 total credit hours. Prereq., graduate standing or instructor consent. Same as MCDB 6621.

**CHEM 6711-3. Advanced Topics in Biochemistry.** Detailed study of current

literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; and protein chemistry. Presentations include faculty lectures and student reports. May be repeated up to 12 total credit hours. Prereqs., one year of biochemistry courses, graduate standing, and instructor consent.

**CHEM 6731-3. Advanced Topics in Biochemistry.** Detailed study of current

literature relative to one main topic is undertaken each semester. Topics covered on a rotating basis include enzyme kinetics and mechanisms; lipids and lipoproteins; chemistry and enzymology of nucleic acids; biochemistry of nucleic acids in eukaryotic cells; and protein chemistry. Presentations include faculty lectures and student reports. May be repeated up to 12 total credit hours. Prereqs., one year of biochemistry courses, graduate standing, and instructor consent.

**CHEM 6801-0. Departmental Research Seminar.** Lectures by visiting sci-

entists and occasionally by staff members and graduate students on topics of current research. Meets once a week. Required for all graduate students in chemistry. Prereq., graduate standing or instructor consent.

**CHEM 6901 (1-6). Special Topics in Chemistry.** Prereq., graduate standing or instructor consent.

**CHEM 6941-3. Master's Candidate.**

**CHEM 6951 (1-6). Master's Thesis.**

**CHEM 7021-2. Seminar: Structural Inorganic Chemistry.** Current research

in the area of structural inorganic chemistry. Concerns topics related to electronic and molecular structure of transition metal complexes. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7101-2. Seminar: Chromatography and Trace Analysis.** Student and

faculty discussions and reports on research advances in chromatography, trace analysis, and environmental chemistry. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7111-2. Seminar: Electrochemistry.** Student and faculty discussions

and reports on research advances in electrochemistry. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7131-1. Seminar in Atmospheric Aerosol Chemistry.** Discusses ad-

vances in atmospheric aerosol chemistry, with emphasis on new methods for analysis and their application to laboratory and field studies. May be repeated up to 2 total credit hours. Prereq., graduate standing or instructor consent. Recommended prereqs., CHEM 5151, 5181.

**CHEM 7141-1. Seminar: Spectroscopy at Dielectric Interfaces.** Focuses on

current research results and relevant literature in the areas of Raman spectroscopy, interfacial reactions/interactions, fluorescence spectroscopy, and photoacoustic spectroscopy. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7161-1. Seminar: Heterogeneous Atmospheric Chemistry.** Topics in atmospheric chemistry emphasizing the structure and reactivity of atmospheric particulates. Presentations on current research and critical evaluations of recent literature. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7211-1. Seminar: Topics in Synthetic Methodology and Natural Product Synthesis.** Discussion of contemporary synthetic organic chemistry with a focus on new methodology and total synthesis of natural products.

**CHEM 7221-1. Seminar: Photochemistry and Free Radical Chemistry.** Current research in areas of organic free radical chemistry, photochemistry, and related topics are presented and discussed. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7231-1. Seminar: Reactive Intermediates.** Application of contemporary ideas of chemical physics to organic molecules. Special attention to structures and bonding in organic ions and radicals. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7241-1. Seminar: Synthetic Organic Chemistry.** Series of seminars on directed total synthesis. Emphasizes modern synthetic methodology and applications to total synthesis of natural products. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7251-1. Selected Topics in Chemical Genetics.** Discusses the brief history of the emerging field of chemical genetics, and focuses on the recent development of concepts, techniques, applications, and its impact on both science and human health. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 7271-1. Seminar: Picosecond Dynamics of Reactions.** Includes development and application of picosecond laser spectroscopy to organic and organometallic reactions. Emphasizes relationship between current theoretical developments and experiments. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7281-1. Seminar: Molecular Self-Assembly.** Discusses current topics and recent advances in molecular self-assembly, with emphasis on new liquid crystal designs and applications. May be repeated up to 2 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 7291-1. Seminar: Physical Organic Chemistry.** Modern experimental techniques and theoretical models in physical organic chemistry are discussed in relation to the development of new materials, such as molecular size tinkertoys to the development of novel photochemical systems and their spectroscopies. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7301-1. Seminar: Synthetic and Mechanistic Chemistry.** Discusses particularly the synthesis of complex organic molecules and the mechanism of reagents used in organic synthesis. Includes a study of transition metal mediated organic reactions. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7311-1. Selected Topics in Organic Materials.** Current research in the area of organic/materials chemistry. Concerns topics related to organic materials synthesis, carbon nanotube functionalization, artificial photosynthesis, gas storage and catalysis. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 7401-1. Seminar in Photochemical Reaction Control.** Discusses progress towards control of molecular reactivity using light, including synthetic methods for creating control subjects. Emphasizes new methods to achieve coherent control. May be repeated up to 2 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 7421-2. Seminar: Negative Ion Chemistry.** Chemistry of negative ions; experimental methods and designs; laser spectroscopy of ions; theoretical methods; reactive dynamics of ions in the gas phase. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7431-1. Seminar: Topics in Theoretical Chemical Physics.** Seminars presented on a variety of topics in theoretical chemical physics. Molecular collisions and unimolecular dynamics predominantly featured. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7441-2. Research Seminar: Theoretical Chemistry.** Studies theoretical description of molecular dynamics as related to rate processes. Focuses on chemical reactions in liquids, absorption-desorption on surfaces, nucleation reactions, and energy flow in molecules. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7461-1. Seminar: Gas Phase Ion Chemistry.** Studies gas phase ion chemistry relevant to thermochemical measurements and atmospheric, interstellar, and biomedical applications.

**CHEM 7471-1. Seminar in Ultrafast Spectroscopy of Proteins.** Discusses advances and developments in biomolecular dynamics, and considers the connection of protein dynamics with function. Emphasizes experimental studies via ultrafast laser spectroscopy. May be repeated up to 2 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 7481-2. Seminar: Molecular Spectroscopy and Photochemistry.** Discussion and presentation of current research in spectroscopy and photochemistry of organic as well as organometallic systems. Reviews state of the art techniques available for the theoretical and experimental characterization of excited states. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7491-1. Seminar: Molecular Vibrational Dynamics.** Topics pertaining to vibrational dynamics of small molecules are discussed, with particular emphasis upon IR laser spectroscopy, van der Waals' clusters, vibrationally induced dipole moments, and predissociation. Discussion of current research and recently published literature. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7501-1. Seminar: Theoretical Molecular Dynamics.** Variety of topics in theoretical chemical physics, emphasizing dynamics of molecules in dissipative environments or in radiation fields. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7511-1. Seminar: Reaction Dynamics in Condensed Phases.** Studies elementary steps in chemical reactions and their observation by ultrafast spectroscopy. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7521-1. Seminar: Atmospheric Kinetics and Photochemistry.** Discusses laboratory studies of degradation mechanisms. Applies these studies to atmospheric phenomena such as global warming and stratospheric ozone loss. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7531-1. Seminar: Surface Chemistry.** Topics in surface science with focus on materials processing and environmental interfaces. Emphasizes kinetic phenomena important in semiconductor fabrication and heterogeneous chemistry on environmental surfaces such as ice and silica. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7551-1. Selected Topics in Ion Spectroscopy.** Treats current topics in the spectroscopy of ions. Seminar lectures are given by graduate students on their research and on literature topics, and the results of both in-house and external research groups are studied. Additionally, ideas for interesting directions of research and new experiments are proposed and discussed. May be repeated up to 2 total credit hours. Prereq., graduate standing or instructor consent.

**CHEM 7601-2. Seminar: Nucleic Acid Chemistry.** Topics in various aspects of current research; emphasizes student readings and presentations. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7611-1. Seminar: Structures and Dynamics of Biopolymers in Solution.** Discussion of experimental and theoretical approaches for probing structures and dynamics of proteins, peptides, and nucleic acids; and computations in molecular dynamics simulation, modeling, and geometry. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7621-1. Seminar: Biochemistry and Molecular Biology of Signal Transduction.** Discusses and reviews the current literature and experimental results in signal transduction, cell cycle and tumor suppressor gene regulation. Emphasizes the understandings of molecular and biochemical mechanisms of the origin of human tumor cells. Prereq., graduate standing or instructor consent.

**CHEM 7651-2. Seminar: Environmental Biochemistry.** Topics in various aspects of current biochemical and environmental research. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7661-1. Structure/Function of Human Mediator Transcription Complexes.** Study of the mechanisms of eukaryotic gene expression with an emphasis on the structure and function of human mediator transcription complexes. Restricted to graduate students or instructor consent.

**CHEM 7671-1. Seminar: Topics in Designing Probes for Signaling Reactions.** Discussion of advances and developments in biomolecular dynamics, with emphasis on experimental studies via ultrafast laser spectroscopy. The connection of protein dynamics with function will also be considered. Restricted to graduate students or instructor consent required.

**CHEM 7691-1. Seminar: Protein Dynamics and the Mechanism of Sensory Proteins.** Discusses recent results and current literature in the areas of the mechanism of sensory proteins, internal motions of proteins, and protein folding. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7701-1. Seminar: Enzyme Mechanisms and Kinetics.** Studies experimental approaches to understand the mechanisms of enzymic catalysis. Techniques include steady-state and pre-steady-state kinetics, isotope trapping and partitioning, inhibition by substrate analogues, and covalent modification of proteins. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7711-1. RNA Mediated Inorganic and Organic Reactions.** Discussion of advances and developments in biomolecular dynamics, with emphasis on experimental studies via ultrafast laser spectroscopy. The connection of protein dynamics with function will also be considered. Restricted to graduate students or instructor consent required.

**CHEM 7741-1. Seminar: Signal Transduction and Protein Phosphorylation.** Devoted to experimental methods for understanding mechanisms of signal transduction in mammalian cells through pathways involving regulation of protein phosphorylation. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7751-1. Seminar: Protein Structure and Folding.** Studies structure and folding of proteins and protein complexes using biophysical methods, including nuclear magnetic resonance (NMR), circular dichroism, and fluorescence spectroscopies. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7761-1. Seminar: Eukaryotic Transcriptional Regulation.** Studies the regulation of transcription by RNA Polymerase II from human promoters. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CHEM 7781-1. Seminar: Topics in Structural Biology.** Discussion of advances and developments in structural biology with emphasis on new methods for protein expression, purification and crystallization; and structure solution implementation. Prereq., graduate standing or instructor consent.

**CHEM 7791-1. Seminar: Topics in Ribonucleoprotein Assemblies.** Studies aspects of the biochemical and structural analysis of ribonucleic acid (RNA) and its interactions with proteins and assemblies into functional ribonucleoprotein (RNP) enzymes. Techniques focus on x-ray crystallography, spectroscopic methods, and biochemical probing. Prereq., graduate standing or instructor consent.

**CHEM 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Classics

### Literature, Culture, and Thought

**CLAS 1010-3. The Study of Words.** Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically. No Greek or Latin required. Same as LING 1010.

**CLAS 1030-3. Introduction to Western Philosophy: Ancient.** Develops three related themes: the emergence in antiquity of a peculiarly scientific mode of

thinking: the place of religious belief within this developing scientific world view and the force of ethical speculation within the culture and political climates of ancient Greece and Rome. No Greek or Latin required. Same as PHIL 1010. Approved for arts and sciences core curriculum: historical context.

**CLAS 1100-3. Greek Mythology.** Covers the Greek myths as documents of early human religious experience and imagination, the source of Greek culture, and part of the fabric of Western cultural tradition. Of particular interest to students of literature and the arts, psychology, anthropology, and history. No Greek or Latin required. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 1110-3. Masterpieces of Greek Literature in Translation.** Surveys Greek authors whose works have most influenced Western thought: Homer, Aeschylus, Sophocles, Euripides, Aristophanes, and Plato. No Greek or Latin required. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 1120-3. Masterpieces of Roman Literature in Translation.** Surveys ideas and culture of the Romans through a study of representative literature: comedy, tragedy, history, philosophy, oratory, the novel, lyric, epic, and didactic poetry. No Greek or Latin required. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 1140-3. Bread and Circuses: Society and Culture in the Roman World.** Surveys the outstanding achievements of Roman culture and society as reflected in literature; philosophy and art; private and official religion; and legal and political thought. No Greek or Latin required. Approved for arts and sciences core curriculum: historical context.

**CLAS 2020-3. Science in the Ancient World.** Covers the development of scientific modes of thought, theory, and research from mythological origins (e.g., Hesiod's poetry) through pre-Socratic philosophers. Culminates in theories and research of Plato and Aristotle, including the Roman Empire. Students read original sources in translation. No Greek or Latin required. Approved for arts and sciences core curriculum: natural science.

**CLAS 2100-3. Women in Ancient Greece.** Examines evidence of art, archaeology, and literature of Greek antiquity from a contemporary feminist point of view. Focuses on women's roles in art, literature, and daily life. No Greek or Latin required. Same as WMST 2100. Approved for arts and sciences core curriculum: human diversity.

**CLAS 2110-3. Women in Ancient Rome.** Uses art, archaeology, and literature to study, from a contemporary feminist point of view, the status of women in works of Roman art and literature, the development of attitudes expressed toward them, and their daily life. No Greek or Latin required. Same as WMST 2110. Approved for arts and sciences core curriculum: human diversity.

**CLAS 2610-3. Paganism to Christianity.** Offers a cultural history of Greek and Roman religion. Students read ancient texts in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. No Greek or Latin required. Same as PHIL 2610. Approved for arts and sciences core curriculum: ideals and values.

**CLAS 3820-3. Greek and Roman Antiquity in Music from 1600 to Present.** Explores the influence of Greek and Roman mythology and history on various genres of music since 1600. Explains the context and meaning of ancient themes and their use by composers from the Renaissance to the present. No Greek or Latin required. Recommended prereq., CLAS 1100. Same as HUMN 3820.

**CLAS 4040-3. Seminar in Classical Antiquity.** Examines an advanced topic in classical language, literature, history, philosophy, art, or culture. Combines the techniques of philology with a critical approach to the literary and material legacy of the past. Prereq., second-year proficiency in Greek or Latin. May be repeated up to 6 total credit hours.

**CLAS 4110-3. Greek and Roman Epic.** Students read in English translation the major epics of Graco-Roman antiquity such as the *Iliad*, *Odyssey*, *Argonautica*, *Aeneid*, and *Metamorphoses*. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required. Same as CLAS 5110 and HUMN 4110. Approved for arts and science core curriculum: literature and the arts.

**CLAS 4120-3. Greek and Roman Tragedy.** Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides, and Seneca in English translation. No Greek or Latin required. Same as CLAS 5120 and HUMN 4120. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4130-3. Greek and Roman Comedy.** Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required. Same as CLAS 5130 and HUMN 4130. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4140-3. The Greek and Roman Novel.** Studies five surviving complete Greek novels from classical antiquity, three Latin novels, and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Readings in English translation. No required prerequisite, but a previous course in classical literature or myth is recommended. Same as CLAS 5140 and HUMN 4131.

**CLAS 4840 (1-4). Independent Study.** No Greek or Latin required. May be repeated up to 7 total credit hours.

**CLAS 5110-3. Greek and Roman Epic.** Same as CLAS 4110.

**CLAS 5120-3. Greek and Roman Tragedy.** Same as CLAS 4120.

**CLAS 5130-3. Greek and Roman Comedy.** Same as CLAS 4130.

**CLAS 5140-3. The Greek and Roman Novel.** Same as CLAS 4140.

**CLAS 5840 (1-3). Graduate Independent Study.** No Greek or Latin required. May be repeated up to 7 total credit hours.

**CLAS 6940 (1-3). Master's Degree Candidate.** No Greek or Latin required.

**CLAS 7840 (1-3). Graduate Independent Study.** No Greek or Latin required. May be repeated up to 7 total credit hours.

## Ancient History

**CLAS 1051-3. The World of the Ancient Greeks.** Presents a survey of the emergence, the major accomplishments, the failures, and the decline of the ancient Greeks, from the Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000–30 B.C.). No Greek or Latin required. Same as HIST 1051. Approved for arts and sciences core curriculum: historical context.

**CLAS 1061-3. The Rise and Fall of Ancient Rome.** Presents a survey of the rise of ancient Rome in the eighth century B.C. to its fall in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments. No Greek or Latin required. Same as HIST 1061. Approved for arts and sciences core curriculum: historical context.

**CLAS 2041-3. War and Society in Ancient Greece.** Studies Greek warfare in its cultural, social, and economic contexts, in the light of anthropological comparisons and modern theories. No Greek or Latin required. Same as HIST 2041.

**CLAS 4021-3. Athens and Greek Democracy.** Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources. Same as CLAS 5021 and HIST 4021.

**CLAS 4031-3. Alexander the Great and the Rise of Macedonia.** Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great. Prereq., one of the following: CLAS 1509, 3039, 3113, 4051, 4139, 4149, CLAS/HIST 1051, 2041, 4021, or 4041. Same as CLAS 5031 and HIST 4031.

**CLAS 4041-3. Classical Greek Political Thought.** Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. No Greek or Latin required. Prereq., CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010, PSCI 2004, or PHIL 3000. Same as CLAS 5041, HIST 4041, and PHIL 4210.

**CLAS 4061-3. Twilight of Antiquity.** Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the east as Byzantium. Emphasizes Christianity; barbarians; social, economic, and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required. Same as CLAS 5061 and HIST 4061.

**CLAS 4071-3. Seminar in Ancient Social History.** Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence and the selective use of comparisons with better known societies. No Greek or Latin required. Same as CLAS 5071 and HIST 4071.

**CLAS 4081-3. The Roman Republic.** Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republican government. Readings are in the primary sources. No Greek or Latin required. Same as CLAS 4081 and HIST 4081.

**CLAS 4091-3. The Roman Empire.** Intense survey of Imperial Rome from the Roman revolution to the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters, and personalities of the empire. No Greek or Latin required. Same as CLAS 5091 and HIST 4091.

**CLAS 4761-3. Roman Law.** Studies the constitutional and legal history of ancient Rome; emphasizes basic legal concepts and comparisons with American law. No Greek or Latin required. Same as CLAS 5761 and HIST 4761.

**CLAS 5021-3. Athens and Greek Democracy.** Same as CLAS 4021.

**CLAS 5031-3. Alexander the Great and the Rise of Macedonia.** Same as CLAS 4031.

**CLAS 5041-3. Classical Greek Political Thought.** Same as CLAS 4041.

**CLAS 5061-3. Twilight of Antiquity.** Same as CLAS 4061 and HIST 5061.

**CLAS 5071-3. Seminar in Ancient Social History.** Same as CLAS 4071.

**CLAS 5081-3. The Roman Republic.** Same as CLAS 4081.

**CLAS 5091-3. The Roman Empire.** Same as CLAS 4091.

**CLAS 5761-3. Roman Law.** Same as CLAS 4761.

**CLAS 7011-3. Seminar in Ancient History.** Examines topics in ancient Greek and Roman history at an advanced seminar level. May be repeated up to 6 total credit hours. Same as HIST 7011.

## Classical Philology

**CLAS 4852 (1-3). Honors Thesis.**

**CLAS 6952 (1-6). Master's Thesis.**

**CLAS 7012-3. Graduate Seminar.** Topic specified in online Schedule Planner. May be repeated up to 9 total credit hours for different topics. Prereq., graduate standing.

**CLAS 8992 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Greek

**CLAS 1013-4. Beginning Classical Greek 1.** For students with no previous knowledge of Greek. Introduces basic grammar and vocabulary.

**CLAS 1023-4. Beginning Classical Greek 2.** Completes the presentation of grammar and introduces reading of literature. Prereq., CLAS 1013 or equivalent.

**CLAS 3013-1. Readings in the Greek New Testament and Septuagint.** Readings in ancient (*koine*) Greek from the New Testament and the Septuagint. Students aim to achieve fluency in reading and to enrich their knowledge of key terms and ideas borrowed from the Greek past in the early Christian tradition. May be repeated up to 4 total credit hours. Prereq., CLAS 1013 and 1023.

**CLAS 3113-3. Intermediate Classical Greek 1.** Reading of selected prose texts of authors in ancient Greek such as Plato, Xenophon, Lysias, and selections from the Greek New Testament. Incorporates review of grammar. May be repeated up to 6 total credit hours. Prereqs., CLAS 1013 and 1023 or equivalent. Meets MAPS requirement for foreign language.

**CLAS 3123-3. Intermediate Classical Greek 2.** Reading of selections from Homer or a Greek tragedy in ancient Greek, with attention to literary form and context as well as advanced grammar and syntax. May be repeated up to 6 total credit hours. Prereqs., CLAS 1013, 1023 and 3113, or equivalent.

**CLAS 4003-3. Topics in Greek Literature.** Continuous readings from Greek prose or poetry in authors such as Plato, Xenophon, Lysias, Homer, or the tragedians. Reading rate will be about six to eight pages per week, and a presentation and/or term paper will be assigned. Recommended prereqs., CLAS 1013/1023 and CLAS 3113/3123.

**CLAS 4013-3. Topics in Greek Prose.** Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Thucydides, Herodotus, Plato, Aristotle, Attic Orators). May be repeated up to 9 total credit hours for different topics. Same as CLAS 5013.

**CLAS 4023-3. Topics in Greek Poetry.** Author or topic in ancient Greek specified in the online Schedule Planner (e.g., Homer, Hesiod, lyric poetry, tragedy, comedy). May be repeated up to 9 total credit hours for different topics. Same as CLAS 5023.

**CLAS 4093-3. Survey of Greek Literature.** Greek literary history in ancient Greek from Homer to the Hellenistic age. Prereqs., CLAS 3113 and 3123 or equivalent. Same as CLAS 5093.

**CLAS 4843 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 5013-3. Topics in Greek Prose.** Same as CLAS 4013.

**CLAS 5023-3. Topics in Greek Poetry.** Same as CLAS 4023.

**CLAS 5093-3. Survey of Greek Literature.** Same as CLAS 4093.

**CLAS 6003-3. Graduate Reading.** Author or topic specified in the online Schedule Planner. May be repeated up to 9 total credit hours for different topics.

**CLAS 6843 (1-3). Graduate Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 7013-3. Graduate Seminar in Greek Literature.** May be repeated up to 7 total credit hours.

## Latin

**CLAS 1014-4. Beginning Latin 1.** Introduces basic grammar and vocabulary. For students with no previous knowledge of Latin.

**CLAS 1024-4. Beginning Latin 2.** Completes the presentation of grammar, incorporates review of fundamentals, and introduces reading of literature. For students with previous experience of Latin. Prereq., CLAS 1014 or equivalent.

**CLAS 2114-4. Intermediate Latin 1.** Readings from Caesar and/or Cicero, with review of grammar. Prereq., CLAS 1024, or equivalent. Meets MAPS requirement for foreign language.

**CLAS 2124-4. Intermediate Latin 2.** Selections from Virgil's Aeneid with attention to literary form and context as well as advanced grammar and syntax. Prereq., CLAS 2114 or equivalent.

**CLAS 3014-3. Introduction to Latin Prose.** Author or topic in Latin specified in the online Schedule Planner (e.g., Cicero, Livy, Pliny). May be repeated up to 9 total credit hours for different topics.

**CLAS 3024-3. Introduction to Latin Poetry.** Author or topic in Latin specified in the online Schedule Planner (e.g., Virgil, Ovid, Catullus, Horace.) May be repeated up to 9 total credit hours for different topics.

**CLAS 4014-3. Topics in Latin Prose.** Author or topic in Latin specified in the online Schedule Planner (e.g., Roman historians, Roman epistolography, Cicero, Roman novel). May be repeated up to 9 total credit hours for different topics. Prereq., CLAS 3014 and 3024, or equivalent. Same as CLAS 5014.

**CLAS 4024-3. Latin Prose Composition.** Reviews grammar and syntax. Introduces Latin prose style and composition. Prereqs., CLAS 3014 and 3024, or equivalent. Same as CLAS 5024.

**CLAS 4044-3. Topics in Latin Poetry.** Author or topic specified in Latin specified in the online Schedule Planner (e.g., Roman elegy, Neronian poetry, Lucretius, Roman satire). May be repeated up to 9 total credit hours for different topics. Prereqs., CLAS 3014 and 3024, or equivalent. Same as CLAS 5044.

**CLAS 4094-3. Survey of Latin Literature.** Covers Latin literary history in Latin from the beginning to the early Empire. Students read select texts of major authors in poetry and prose. Prereqs., CLAS 3014 and 3024, or equivalent. Same as CLAS 5094.

**CLAS 4824-3. Latin Teaching Methods: Open Topics.** Covers specialized topics in Latin pedagogy specified in the online Schedule Planner. Same as CLAS 5824.

**CLAS 4844 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 5014-3. Topics in Latin Prose.** Same as CLAS 4014.

**CLAS 5024-3. Latin Prose Composition.** Same as CLAS 4024.

**CLAS 5044-3. Topics in Latin Poetry.** Same as CLAS 4044.

**CLAS 5094-3. Survey of Latin Literature.** Same as CLAS 4094.

**CLAS 5404-3. Special Project: Teaching.** Trains students to prepare classroom-ready materials, which are then tested in the students' own classroom. Required of master's candidates (teaching of Latin option). Prereq., fulfillment of the remaining requirements for MA (teaching of Latin) or 27 hours of graduate work in classics.

**CLAS 5804-3. Accelerated Latin 1.** Beginning course for graduate students. Grammar survey, intensive reading. No previous knowledge of Latin required.

**CLAS 5814-3. Accelerated Latin 2.** Continuation of CLAS 5804. Reading of advanced texts: Caesar, Cicero, Ovid. Prereq., CLAS 5804. For graduate students.

**CLAS 5824-3. Latin Teaching Methods: Open Topics.** Same as CLAS 4824.

**CLAS 6004-3. Graduate Reading.** Author or topic specified in the online Schedule Planner. May be repeated up to 9 total credit hours for different topics.

**CLAS 6844 (1-3). Graduate Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 7014-3. Graduate Seminar in Latin Literature.** May be repeated up to 7 total credit hours.

## Honors

**CLAS 1115-3. Honors: Masterpieces of Greek Literature in Translation.** Students read about mythological heroes and historical individuals from Achilles to Socrates in Greek literature. Class discusses why the Greeks told stories the way they did and what those stories might have meant to them and might mean to us. Approved for arts and sciences core curriculum: literature and the arts.

## Art and Archaeology

**CLAS 1509-4. Trash and Treasure, Temples and Tombs: Art and Archaeology of the Ancient World.** Introduces the art and archaeology of ancient Egypt, Mesopotamia, Greece and Rome, examining various ancient approaches to power, religion, death and the human body. Analyzes art, architecture, and everyday trash to learn about ancient humanity. Same as ARTH 1509. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**CLAS 2009-3. Modern Issues, Ancient Times.** Considers issues of vital importance to humans, both now and in ancient times. Topics such as food, death, sex, family, literacy, or power are explored to consider how ancient societal norms and attitudes evolved, and how they relate to modern culture. Draws on material and literary evidence to develop an understanding of the complexities of ancient life. Same as ANTH 2009. Approved for arts and sciences core curriculum: historical context.

**CLAS 2019-3. Pompeii and the Cities of Vesuvius.** Introduces the towns and villas buried by the eruption of Mt. Vesuvius in 79 C.E. Explores the layout and decoration of ancient Roman houses, the variety of artifacts uncovered as evidence for daily life and the history of the excavations. Same as ARTH 2019. Approved for arts and sciences core curriculum: historical context.

**CLAS 3039-3. Greek Art and Archaeology.** Covers prehistoric Aegean through the fourth century B.C.E., considering architecture, pottery, painting, sculpture, and personal ornament. Societal customs such as use of space and burial patterns are considered as well as art and its uses, to help understand developments in Greek culture. Credit not granted for this course and CLAS/FINE 1009. Same as ARTH 3039. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 3049-3. Introduction to Roman Art and Architecture.** Introduces the monuments and sites of the ancient Roman world from the foundation of Rome (753 B.C.E.) to Constantine (306–307 C.E.). Emphasizes the relationship of art, architecture, and artifacts to the political, social, and religious institutions of Italy and the provinces. Same as ARTH 3049. Credit not granted for this course and CLAS 1019 or FINE 1019. Approved for arts and sciences core curriculum: literature and the arts.

**CLAS 4109-3. Ancient Italian Painting.** Explores the problems, theories and methods for understanding the iconography, styles, topologies, contexts and

techniques of fresco wall painting in ancient Italy from the 6th century B.C.E. to the 4th century C.E. Topics covered include Etruscan tomb paintings, late Republican and early imperial fresco paintings from Rome and Campania, and later Roman wall paintings, including the painted images in ancient catacombs. Previous coursework on ancient Italy or the history of pre-modern art is highly recommended. Recommended prereqs., CLAS/ARTH 1509, 3049. Same as CLAS 5109 and ARTH 4109.

**CLAS 4119-3. Roman Sculpture.** Examines ancient Roman sculpture, emphasizing the display, iconography, and production of private and public monuments in the Roman Empire. Same as CLAS 5119 and ARTH 4119.

**CLAS 4129-3. Aegean Art and Archaeology.** A detailed study of the cultures of prehistoric Greece, the Cycladic Islands, and Crete, their art and archaeology, and their history within the broader context of the eastern Mediterranean, from earliest human settlement to the collapse of the Bronze Age at about 1100 B.C.E. Emphasis is on palace states. Same as ANTH/ARTH 4129, CLAS 5129.

**CLAS 4139-3. Greek Vase Painting.** A comprehensive overview of Greek vase painting, from prehistoric through the fourth century B.C.E. Emphasis is on learning the development of primary decorative styles and on refining skills of visual analysis, scholarly research, critical thinking, oral commentary, and written presentation. Same as CLAS 5139 and ARTH 4139.

**CLAS 4149-3. Greek Cities and Sanctuaries.** Examines Greek architecture in context, from the ninth century B.C.E. into the Hellenistic period, considering the use of space, both in religious and in civic settings, and using texts as well as material culture. Emphasis is on developing analytical skills. Same as CLAS 5149 and ARTH 4149.

**CLAS 4169-3. Topics in Ancient and Classical Art and Archaeology.** In-depth consideration of an aspect of ancient Mediterranean culture. Topics vary; they may include ancient wall painting, Greek sculpture, artists and patrons, the ancient Near East, Egyptian art and archaeology, or Etruscan art and archaeology. May be repeated up to 9 total credit hours providing the topics are different. Same as CLAS 5169 and ARTH 4169.

**CLAS 4199-3. Roman Architecture.** Examines the designs, functions, and construction methods of ancient Roman towns, temples, baths, houses, and civic structures, as well as utilitarian structures including roads and aqueducts. Emphasizes Roman architectural forms and spaces as vehicles for political propaganda and empire consolidation. Same as CLAS 5199 and ARTH 4199.

**CLAS 4209-3. Classical Archaeological Field Methods.** Offers experiential learning in theories and methods of field excavation at the Villa of Maxentius in Rome. Applies methods for stratigraphic excavation, electronic surveying with GIS, ceramic analysis, numismatic analysis, architectural construction materials and methods, artifact conservation and data processing and documentation. Offered abroad only. May be repeated up to 6 total credit hours. Coreq., CLAS 4219 for first 3 credit hours. Recommended prereqs., CLAS/ARTH 1509, 3049. Same as CLAS 5209 and ARTH 4209.

**CLAS 4219-3. Maxentius and the City of Rome.** Combines seminar discussion and site visits in Rome and Tivoli to understand the excavations at the Villa of Maxentius and its artifacts in the broader contexts of Roman architectural development, late Roman art, and late imperial Roman history. Offered abroad only. Must be taken concurrently with CLAS/ARTH 4209 or CLAS 5209. Recommended prereqs., CLAS/ARTH 1509, 3049. Same as CLAS 5219 and ARTH 4219.

**CLAS 4269-3. Art and Archaeology of the Ancient Near East.** Examines civilizations of the Iran-Iraq region from the rise of urbanism in Mesopotamia through the era of the first "world empire," Achaemenid Persia. Emphasizes the material record of religious and state institutions of the ancient Near East, especially monuments that illustrate concepts of kingship. Explores notions of style, symbolism, visual rhetoric, text-image synthesis, patronage, creativity, and roles of artists. Recommended prereq., CLAS/ARTH 1509. Same as CLAS 5269 and ARTH 4269. Approved for arts and sciences core curriculum: human diversity.

**CLAS 4849 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**CLAS 5109-3. Ancient Italian Painting.** Same as CLAS 4109 and ARTH 5109.

**CLAS 5119-3. Roman Sculpture.** Same as CLAS 4119 and ARTH 5119.

**CLAS 5129-3. Aegean Art and Archaeology.** Same as CLAS 4129.

**CLAS 5139-3. Greek Vase Painting.** Same as CLAS 4139.

**CLAS 5149-3. Greek Cities and Sanctuaries.** Same as CLAS 4149 and ARTH 5149.

**CLAS 5159-3. Hellenistic Art and Archaeology.** Examines art and archaeology from the period following the death of Alexander the Great (late fourth century B.C.E.) to the conquest of Greece by the Romans (middle second century B.C.E.). Same as ARTH 5159.

**CLAS 5169-3. Topics in Ancient and Classical Art and Archaeology.** Same as CLAS 4169 and ARTH 4169.

**CLAS 5179-3. Periclean Athens.** Explores in detail the buildings, sculptures, pots, and foreign imports of Athens under the leadership of Perikles, considering material culture of individuals as much as civic programs. Emphasis is on ways in which the textual and archaeological evidence complement and/or contradict one another. Same as ARTH 5179.

**CLAS 5189-3. Augustan Rome.** Explores the sculptures, paintings, and buildings constructed in Rome during the reign of the first emperor Augustus (27 B.C.E.–14 C.E.). Examines the monuments of Augustan Rome as both dependent on republican precedents and yet innovative with respect to designs and meanings. Same as ARTH 5189.

**CLAS 5199-3. Roman Architecture.** Same as CLAS 4199 and ARTH 4199.

**CLAS 5209-3. Classical Archaeological Field Methods.** Same as CLAS 4209.

**CLAS 5219-3. Maxentius and the City of Rome.** Same as CLAS 4219.

**CLAS 5269-3. Art and Archaeology of the Ancient Near East.** Same as CLAS 4269/ARTH 5269.

**CLAS 6109-3. Topics in Critical Theory and Ancient Art and Archaeology.** Topics will vary and may focus on a particular approach to ancient material culture or on a particular time period or artifact category. Emphasis is placed on reading and using theory in considering the ancient world. May be repeated once for credit, provided the topics are different.

**CLAS 6119 (1-3). Graduate Independent Study in Classical Art and Archaeology.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**CLAS 7109-3. Graduate Seminar in Ancient and Classical Art and Archaeology.** Topics vary. Emphasis is on gaining expertise in using archaeological reports in tandem with (or contradiction to) textual sources, on reading and using critical theory, on improving analytical skills and discussion, and on honing discussion leadership abilities. May be repeated up to 6 total credit hours providing the topics are different.

## Communication

**COMM 1210-3. Perspectives on Human Communication.** Surveys communication in a variety of contexts and applications. Topics include basic concepts and general models of communication, ethics, language and nonverbal communication, personal relationships, group decision making, organizational communication, and impact of technological developments on communication. Required for PRCM and COMM majors. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**COMM 1300-3. Public Speaking.** Covers theory and skills of speaking in various public settings. Examines fundamental principles from rhetorical and communication theory and applies them to oral presentations. Required for PRCM and COMM majors.

**COMM 1600-3. Group Interaction.** Covers basic theories, concepts, and characteristics that underlie face-to-face interactions in interpersonal, small group, and organizational settings. Activities stress the development of both task and relational skills in these settings. Required for PRCM and COMM majors.

**COMM 2000-3. Topics in Communication.** Investigates select topics in communication. Does not count toward the 2000-level courses required for the major, unless explicitly stated in the course schedule. May be repeated up to 6 total credit hours on different topics. Recommended prereqs., COMM 1210 and 1600.

**COMM 2360-3. Campaigns and Revolutions.** Introduces concepts in rhetoric and argumentation that are used to explain significant social and political changes in our society. The goal is to show how social actors use rhetoric

to promote some social goals and hinder others. Recommended prereqs., COMM 1210 and 1600. Restricted to sophomores/juniors/ seniors.

**COMM 2400-3. Discourse, Culture and Identities.** Examines how aspects of talk (e.g., turn-taking, speech acts, narratives, dialect, and stance indicators) link with identities (e.g., ethnic and racial, age, gender, work-related, and personal). Considers how communication is central to constructing who people are and examines social controversies related to talk and identities. Approved for arts and sciences core curriculum: human diversity.

**COMM 2500-3. Interpersonal Communication.** Focuses on basic processes in face-to-face interaction, including verbal and nonverbal messages, coordination in conversation, messages about self and others, and communication in personal relationships. Emphasizes theory and concepts rather than skills. Recommended prereqs., COMM 1210 and 1600. Restricted to sophomores/juniors/seniors.

**COMM 2600-3. Organizational Communication.** Provides a communicatively based definition of formal organization and deals with individual-organizational relationships. Addresses topics such as organizational theory, organizational culture, power, technology, decision making, teamwork, leadership, diversity, gender, socialization, and ethics. Recommended prereqs., COMM 1210 and 1600. Restricted to sophomores/juniors/seniors.

**COMM 3000-3. Issues in Communication.** Explores select issues in communication. May be repeated up to 6 total credit hours on different issues. Prereqs., COMM 1210 and 1600 or instructor consent.

**COMM 3210-3. Human Communication Theory.** Acquaints students with general, thematic, and contextual theories of human communication. Gives attention to criteria for evaluating theories. Prereqs., COMM 1210 and 1600. Restricted to junior/senior COMM majors.

**COMM 3300-3. Rhetorical Foundations of Communication.** Provides the rhetorical foundations of communication through study of the humanistic traditions of rhetorical theory, with applications to social interaction and message analysis. Prereqs., COMM 1210, 1300 and 1600. Restricted to junior/senior COMM majors.

**COMM 3310-3. Principles and Practices of Argumentation.** Focuses on principles of argument, the process of critical decision making, and uses and limitations of logic and evidence. Contemporary issues (personal, social, political, or philosophical) are analyzed and debated. Prereqs., COMM 1210 and 1600. Credit not granted for this course and COMM 2310.

**COMM 3320-3. Persuasion in Society.** Explores how persuasion influences decision making, focusing on different definitions and models of persuasion, ethical perspectives on persuasion, qualitative and quantitative research on persuasion, and the tools of motivation, as well as how to create effective and ethical persuasive messages. Prereqs., COMM 1210 and 1600.

**COMM 3340-3. Political Communication.** Provides an overview of the role of communication in contemporary political life. Topics include political communication theories, political campaign communication, media and political communication, and the role of political communication in promoting democracy and public policy. Prereqs., COMM 1210 and 1600.

**COMM 3410-3. Intercultural Communication.** Explores complex relationships between culture and communication processes from various conceptual perspectives, such as social, psychological, interpretive, and critical. Considers the important role of context (e.g., social, historical, and cultural) in intercultural interactions. Prereqs., COMM 1210 and 1600. Approved for arts and sciences core curriculum: human diversity.

**COMM 3510-3. Family Communication.** Explores communication in families from various theoretical perspectives, such as social constructionism, systems theory, and dialectical theory. Communication patterns and processes created and sustained by family members are examined, including rules, roles, stories, rituals, myths, metaphors, themes, and cycles. Prereqs., COMM 1210 and 1600.

**COMM 3610-3. Communication, Technology, and Society.** Presents theory, research, and exploration into computer-based technologies; studies implications for communication, interaction, and social relationships. Recommended prereqs., COMM 1210 and 1600.

**COMM 3740-3. Qualitative Communication Research Methods.** Provides an understanding of philosophies, theories, and methods associated with the

study of communication in natural settings. Focuses on strategies of collecting, analyzing, and reporting qualitative data, including participant observation, in-depth interviewing, textual analysis, and ethnographic narrative. Prereqs., COMM 1210 and 1600. Restricted to junior/senior COMM majors.

**COMM 3750-3. Quantitative Research Methods.** Introduces empirically oriented research methods in communication, critical review of the logic of social-scientific principles in communication, and analysis of quantitative data. Prereqs., COMM 1210 and 1600. Restricted to junior/senior COMM majors.

**COMM 3760-3. Rhetorical Criticism.** Applies key concepts from rhetorical theory to the analysis of specific speeches, written texts, and social situations within the humanistic tradition. Students read a variety of types of criticism and are encouraged to develop their own strategies for critical analysis. Prereqs., COMM 1210 and 1600. Restricted to junior/senior COMM majors.

**COMM 4000 (1-3). Advanced Topics in Communication.** Analyzes special interest areas of communication theory, research, and practice. Course format involves lecture, discussion, investigative analysis, and practical application. May be repeated twice for credit on different topics. Prereqs., COMM 3210 and 3300 or consent required. Restricted to junior/senior COMM majors.

**COMM 4100-3. Seminar in Honors Thesis Writing and Research.** Provides the opportunity for students writing an honors thesis to develop their understanding of the research process and to improve their research and writing skills. Restricted to COMM majors in the honors program.

**COMM 4220-3. Senior Seminar: Functions of Communication.** Topical seminar on the functions of communication across interpersonal, group, organizational, and public contexts. Reviews current theory and research on topics such as communication and conflict, persuasion, and ethical dimensions of communication practices. May be taken twice for credit on different topics. Prereqs., COMM 3210 and 3300. Restricted to junior/senior COMM majors.

**COMM 4300-3. Senior Seminar: Rhetoric.** Reviews current theory and research on topics such as rhetoric and publics, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns. May be taken twice for credit on different topics. Prereqs., COMM 3210 and 3300. Restricted to junior/senior COMM majors. Same as COMM 5300.

**COMM 4400-3. Senior Seminar: Communication Codes.** Topical seminar on dialogic and nonverbal communication codes. Reviews current theory and research on topics such as relationship between verbal and nonverbal codes, discourse processes, and cultural differences in communication processes. May be repeated up to 6 total credit hours on different topics. Prereqs., COMM 3210 and 3300. Restricted to junior/senior COMM majors.

**COMM 4510-3. Senior Seminar: Interpersonal Communication.** Reviews current theory and research on topics such as strategic interaction, relationship formation and maintenance, and identity and self-presentation. May be taken twice for credit on different topics. Prereqs., COMM 3210 and 3300. Restricted to junior/ senior COMM majors.

**COMM 4600-3. Senior Seminar: Organizational Communication.** Reviews current theory and research on topics such as communication and organizational decision making, organizational culture, gender relations, communication technology, and power and control in organizations. May be repeated up to 6 total credit hours on different topics. Prereqs., COMM 3210 and 3300. Restricted to junior/senior COMM majors. Same as COMM 5600.

**COMM 4610-3. Communication Studies of Science and Technology.** Reviews current theory and research associated with science, technology, and medicine. Topics include new communication technologies in organizations and society, discourses of scientific theory and science policy, and interaction in clinical setting. May be taken twice for credit on different topics. Prereqs., COMM 3210 and 3300 or instructor consent.

**COMM 4840 (1-6). Undergraduate Independent Study.** Note that the 14-hour limit in the major applies to any combination of independent study and internship credit. This course does not count toward the 33 credit hours required for the major. Recommended prereq., COMM 3250 or 3360. Restricted to junior/ senior COMM majors.

**COMM 4930 (1-6). Internship.** Studies are pursued in communication-related work experience projects that generally require 40 hours on the job per credit hour and evidence (e.g., journal, paper, and employer evaluation) of significant learning. Prereqs., COMM major status, 72 hours of overall course work,



18 hours of communication course work completed, 2.50 overall GPA, and a faculty sponsor. Restricted to junior/senior COMM majors. The 14-hour limit in the major applies to any combination of independent study and internship credit. This course does not count toward the 33 hours required for the major. Course is offered only for pass/fail credit.

**COMM 4950 (1-6). Senior Thesis: Honors.** For exceptional communication majors who wish to graduate with department honors and receive credit for writing an honors thesis. Prereqs., COMM 4100, overall GPA of 3.35 or higher, and COMM GPA of 3.50 or higher.

**COMM 5210-3. Readings in Communication Theory.** Critical overview of leading theoretical traditions in communication studies. Gives attention to metatheoretical issues, including epistemological foundations, the structure of communication theory as a field, and reflexivity between communication theory and cultural practice. Required for doctoral students in COMM; optional for master's students. Restricted to graduate students or instructor consent.

**COMM 5230-3. Applied Communication.** Examines application of communication concepts, theories, methods, facilitations, and other practices to address real-world issues and problems. Discusses conceptual issues framing applied communication, examines purposes and methods informing such scholarship, and provides opportunity to evaluate and propose research. Prereq., graduate standing or instructor consent.

**COMM 5300-3. Seminar: Rhetoric.** Prereq., graduate standing or instructor consent. Same as COMM 4300.

**COMM 5310-3. Contemporary Rhetorical Criticism.** Advanced critical analysis of rhetorical texts in terms of how they shape issues and appeal for judgment, create identities for speakers and their audiences, and construct perceptions of time, space, and the human condition. Prereq., graduate standing or instructor consent.

**COMM 5320-3. Readings in Rhetoric.** Survey of classical and contemporary readings in rhetoric. Required for doctoral students in COMM; optional for master's students. Restricted to graduate students or instructor consent.

**COMM 5420-3. Readings in Group Interaction.** Reading course examining communicative problems, practices, and outcomes in groups. Definitions of group and interaction, meta-theoretical and theoretical orientations, methodological practices for studying group interactions, including boundary development and management, interpersonal symbolic practices, deliberation, dialogue, and decision making are examined. Prereq., graduate standing or instructor consent.

**COMM 5520-3. Readings in Interpersonal Communication.** Survey course of advanced readings in interpersonal communication. Focuses on historical and contemporary works, with emphasis on theory and research. Prereq., graduate standing or instructor consent.

**COMM 5600-3. Seminar: Organizational Communication.** Prereq., graduate standing or instructor consent. Same as COMM 4600.

**COMM 5610-3. Organizational Culture and Symbolism.** Focuses on relationship between ideological elements (e.g., norms, values, and beliefs) and symbolic practices (e.g., metaphor, ritual, and storytelling) of organizational culture. Analyzes topics from viewpoints of academic theory and managerial practice. Reviews interpretive methods of researching workplace culture and symbolism. Prereq., graduate standing or instructor consent.

**COMM 5620-3. Readings in Organizational Communication.** Survey of traditional and contemporary readings in organizational communication. Treats theory, research, and application from a variety of perspectives. Prereq., graduate standing or instructor consent.

**COMM 5720-3. Readings in Communication and Technology.** Survey of multidisciplinary research that examines various relationships between communication and technology. Students are encouraged to develop critical skills in perceiving assumptions and perspectives that motivate major theories in this area, and to examine how these have changed over time. Prereq., graduate standing or instructor consent.

**COMM 6010-3. Communication Research and Theory.** Provides an integrative overview of approaches and areas of study in communication. Required for MA and PhD communication students. Prereq., graduate standing in COMM.

**COMM 6020-3. Quantitative Research Methods.** Introduces students to the practice of quantitative research in communication: conceptualization and critique of research projects, coding, experimental and survey approaches, reliability and validity, and statistical reasoning and methods of analysis. Required for doctoral students in COMM; optional for master's students. Prereq., graduate standing or instructor consent.

**COMM 6030-3. Qualitative Research Methods.** Introduction to the epistemology, methodology, and representational practices associated with qualitative studies in communication. Fieldwork methods emphasized include participant observation, interviewing, and document/artifact analysis. Required for doctoral students in communication; optional for master's students. Prereq., graduate standing or instructor consent.

**COMM 6200 (1-3). Seminar: Selected Topics.** Facilitates understanding of current and past theory and research on a selected topic in communication and the ability to develop new theory and research on that topic. May be repeated up to 9 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**COMM 6310-3. Rhetorical Criticism.** Reviews current critical methods and issues related to rhetorical criticism, such as contemporary theory of rhetorical criticism, continental discourse theory, and critical theory. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent. Recommended prereqs., COMM 5310 and 5320.

**COMM 6320-3. Rhetorical Theory.** Reviews current theory and research on topics such as contemporary rhetorical theory, rhetoric and public life, rhetoric as an interpretive social science, and rhetoric of social movements and political campaigns. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5320.

**COMM 6330-3. Seminar in Rhetoric of Science and Technology.** Surveys foundational texts and contemporary research in the rhetoric of science and technology. Focuses on the role of persuasion in the production of scientific knowledge and technological artifacts, professional discursive practices, and public understandings of science and technology. Emphasizes critical analysis of major theoretical and methodological traditions. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5320.

**COMM 6340-3. Rhetoric and Civic Community.** Considers performances of public life as rhetorical inducements of civitas. Topics include negotiation of self-regulation among interdependent partners, rhetorical exclusions and/or counterpublics, and dialectical tensions of public/private as these contribute to and have civic consequences for publicness, community, and social will. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5320.

**COMM 6350-3. Seminar in Argumentation.** Surveys foundational texts and contemporary research in argumentation. Analysis of distinctions between philosophical and rhetorical approaches to argument. Critical analysis of major theoretical and methodological traditions and topics with an emphasis on social dimensions of argument. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5320.

**COMM 6360-3. Social and Cultural Theory.** Traces select traditions in social and/or cultural theory, emphasizing how these traditions affect and are affected by the field of rhetoric studies. Examines the origins and resolutions of major debates in social and/or cultural theory from a rhetorical perspective. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5320.

**COMM 6410-3. Discourse Analysis.** Acquaints students with the main types of discourse analysis: conversation analysis, critical discourse analysis, and rhetorically-informed discourse approaches. Teaches how to conduct discourse analysis, including transcribing, selecting excerpts, documenting inferences, and linking to scholarly controversies. Prereq., graduate standing or instructor consent.

**COMM 6420-3. Interaction Analysis.** Educates students in one of a selected set of methodological specializations used in the study of human interaction. May be repeated up to 6 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**COMM 6430-3. Communication in Family Groups.** Examines theories of family communication, focusing on how group processes influence family life. Prereq., graduate standing or instructor consent.

**COMM 6435-3. Interpersonal Processes in Communication.** Focuses on key processes in interpersonal communication relevant to understanding interaction at the dyadic, group, and organizational levels. Examines theory and research on selected interpersonal processes such as facework/identity, support/emotional communication, relational communication, and conflict in interaction. Prereq., graduate standing or instructor consent.

**COMM 6440-3. Grounded Practical Theory.** Examines theory, method, and application of grounded practical theory, an approach to building normative theory through description, critique, and theoretical reconstruction of situated communication practices. Semester project involves analysis of a sample of discourse from a public or field observation setting. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5210.

**COMM 6450-3. Group Interaction Facilitation and Pedagogy.** Examines theory, research, and practice associated with facilitating group interaction processes (e.g., group creation, conflict communication management, conversation and discussion, task accomplishment, and team communication), including facilitation associated with teaching an introductory group interaction course. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5420.

**COMM 6470-3. Meetings, Their Practices and Problems.** Explores the history, routine communicative practices, common interactional troubles, cross-cultural differences, and expectations about "ideal" communicative conduct for workplace and public meetings. Seminar project involves field study of a meeting group. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 6030.

**COMM 6730-3. Collaboration and Decision Making in Organizations.** Explores theory and research on communication processes associated with collaboration and decision making in contemporary organizations, particularly as they are influenced by participation programs, technology, and team structures. Prereq., graduate standing or instructor consent. Recommended prereqs., COMM 5620 and 6010.

**COMM 6740-3. Power and Control in Organizational Communication.** Reviews theory and research in organizational communication concerned with power and control. Focuses on symbolic practices of influence in the context of organizational structure and culture. Reviews interpretive and critical theories emphasizing relationships between power, discourse, identity, and institutions. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5620.

**COMM 6750-3. Communication and Organizational Change.** Addresses the role of communication in cultural change efforts in organizations. Topics include the nature and function of organizational cultures, the role of leadership, ethical issues, and member involvement in change processes. Specific organizational cases are highlighted throughout. Prereq., graduate standing or instructor consent. Recommended prereq., COMM 5620.

**COMM 6840 (1-3). Master's Independent Study.** May be repeated up to 6 total credit hours.

**COMM 6940 (1-3). Master's Degree Candidate.**

**COMM 6950 (1-6). Master's Thesis.**

**COMM 8840 (1-6). Doctoral Independent Study.** May be repeated up to 6 total credit hours.

**COMM 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Comparative Literature

**COML 5000-3. Proseminar.** Introduces basic issues in comparative literature and basic problems in literary history. Provides an overview of history and rationale of the discipline, traditional areas of research, and recent developments. Prereq., graduate standing or instructor consent.

**COML 5350-3. Studies in Prose Narrative.** Examines both short and long narrative prose fiction from a variety of periods and from diverse national literatures. Focuses on issues of defining genre and on the origins and significance of narrative prose within its cultural context. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5352-3. Russian Novel: Theory and Practice.** Examines the Russian novel and its evolution as well as Western and Russian theories of the novel as they engage and reflect upon the claims of modernity. May be repeated up to 6 total credit hours. Restricted to graduate students or instructor consent required. Same as GSLL 5352.

**COML 5360-3. Studies in Drama.** Covers selected drama topics using a comparative approach. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5370-3. Studies in Poetry.** Explores topics and problems in rhetoric and poetic practice from antiquity to the present day. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5410-3. Translation.** Review of theories and practices of literary translation in their linguistic, historical, cultural, and other contexts. Translation of literary and other works from chosen foreign languages, commentaries, and analyses. Prereq., graduate standing or instructor consent.

**COML 5504-3. Goethe's *Faust*.** Systematic study of the Faust motif in Western literature, with major emphasis on *Faust I* and *II* by Goethe and Thomas Mann's *Doctor Faustus*. Restricted to graduate students or instructor consent required. Same as HUMN 4504 and GRMN 5504.

**COML 5540-3. Studies in the Baroque.** Explores the literary, intellectual, and aesthetic culture of the European baroque of the late 16th and 17th centuries through different topics pertinent to this period. Presents an interdisciplinary analysis of baroque literature, philosophy, science, and art. Illuminates the complex historical transition from the Renaissance to the modernity of the Enlightenment. Prereq., graduate standing or instructor consent.

**COML 5610-3. Introduction to Literary Theory.** Covers major trends in 20th-century critical thinking. May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5620-3. History of Literary Criticism.** Prereq., graduate standing or instructor consent.

**COML 5660-3. Themes, Motifs, and Characters.** May be repeated once for credit. Prereq., graduate standing or instructor consent.

**COML 5830-3. Topics in Literature and History.** May be repeated up to 6 total credit hours. Restricted to graduate students or instructor consent required. Same as GSLL 5830.

**COML 5840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Restricted to graduate students or instructor consent required.

**COML 6040-3. Seminar: A Selected Topic.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**COML 6940 (1-3). Candidate for Degree.**

**COML 6950 (1-6). Master's Thesis.**

**COML 6970-3. Colloquium in Comparative Literature.** May be repeated up to 6 total credit hours.

**COML 7840 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**COML 8990 (1-10). Doctoral Dissertation.**

## Ecology and Evolutionary Biology

*The Department of Ecology and Evolutionary Biology (formerly the Department of Environmental, Population, and Organismic Biology) offers two general biology sequences. EBIO 1210 and 1200 are lecture courses intended for EBIO and other science majors. A year of high school chemistry is presumed. Accompanying laboratories (EBIO 1230 and 1240) are also available. EBIO 1030 and 1040 are designed for nonscience majors; an accompanying lab (EBIO 1050) is available.*

*Students with scores of 4 or 5 on the AP biology test receive 8 hours of credit and are exempt from EBIO 1210–1240. Students who score in the 66th percentile or higher on the CLEP test in biology receive 6 hours of credit and are exempt from EBIO 1210 and 1220. MCDB 1150 and 1151 can substitute for EBIO 1210 and 1230. EBIO majors with transfer credit in biology from other institutions and/or advanced placement credits must consult the EBIO undergraduate advising and resource center for proper placement.*

*EPOB courses have been renumbered under EBIO and IPHY course numbers. Credit will not be granted for a course taken under its former number and its current number.*

**EBIO 1030-3. Biology: A Human Approach 1.** Lect. Studies the principles of biology and their implications. Central theme is humans and the environment, emphasizing ecology, natural resource conservation, and the interrelatedness of a growing human population. Recommended for nonscience majors. Meets MAPS requirement for natural science: non-lab. Approved for arts and sciences core curriculum: natural science.

**EBIO 1040-3. Biology: A Human Approach 2.** Lect. Continues EBIO 1030, focusing on the function of the human body, and maintenance of dynamic equilibrium in the internal environment in the face of a continually changing external environment. Discusses factors influencing these homeostatic conditions and how and why they change. Recommended for nonscience majors. Prereq., EBIO 1030. Approved for arts and sciences core curriculum: natural science.

**EBIO 1050-1. Biology: A Human Approach Laboratory.** One two-hour lab per week. Provides experiments and exercises relating to concepts presented in EBIO 1030 and 1040 Biology: A Human Approach 1 and 2. This course uses animals and/or animal tissues. Recommended for nonscience majors. When taken with EBIO 1030, meets MAPS requirement for natural science: lab. Approved for arts and sciences core curriculum: natural science.

**EBIO 1210-3. General Biology 1.** Lect. Provides a concentrated introduction to molecular, cellular, genetic, and evolutionary biology. Emphasizes fundamental principles, concepts, facts, and questions. Intended for science majors. Credit not granted for this course and EPOB 2060, 2660 or KAPH 2060. Meets MAPS requirement for natural science. Approved for arts and sciences core curriculum: natural science.

**EBIO 1220-3. General Biology 2.** Provides a concentrated introduction to organisms, homeostasis, development, behavior, and ecology. Emphasizes fundamental principles, concepts, facts, and questions. Intended for science majors. Prereq., EBIO 1210 or equivalent. Credit not granted for this course and EPOB 2050 or 2650. Approved for arts and sciences core curriculum: natural science.

**EBIO 1230-1. General Biology Laboratory 1.** One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 1. Intended for science majors. Prereq. or coreq., EBIO 1210. Credit not granted for this course and EPOB 2060, 2660 or KAPH 2060. Meets MAPS requirement for natural science. Approved for arts and sciences core curriculum: natural science.

**EBIO 1240-1. General Biology Laboratory 2.** One 3-hour lab per week. Consists of experiments and exercises to provide an extension of basic concepts and scientific approaches presented in General Biology 2. Intended for science majors. Prereq. or coreq., EBIO 1220 or equivalent. Credit not granted for this course and EPOB 2050 or 2650. Approved for arts and sciences core curriculum: natural science.

**EBIO 1300 (1-3). Topics in Biological Sciences.** Covers special topics in biology for freshmen or nonmajors. Introduces scientific methods and principles in biology, as well as issues of current interest in biology. Does not count toward the major in EBIO.

**EBIO 1840 (1-6). Independent Study (Freshman).** May be repeated up to 6 total credit hours.

**EBIO 2010 (1-3). Environmental Issues and Biology.** Lect. Describes how the natural environment is currently stressed by a variety of human actions. Examines the nature of these environmental problems and their impact on living organisms, both human and nonhuman species.

**EBIO 2040-4. Principles of Ecology.** Lect. and lab. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Labo-

ratory emphasizes techniques of field biology. Uses animals and/or animal tissues. Prereqs., EBIO 1030, 1040, and 1050, or EBIO 1210, 1220, 1230, and 1240. Credit not granted for this course and EPOB 2050 or EPOB 2650 or EPOB 3020 or EBIO 2640.

**EBIO 2070-4. Genetics: Molecules to Populations.** Lect. and rec. Covers principles of genetics and developmental biology at levels of molecules, cellular organelles, individuals, and populations; asexual and sexual life cycles; and heredity. Recitations allow discussion of genetics problems and implications of genetic principles, and provide demonstrations and simulations of genetic processes. Intended for sophomore majors in EBIO. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Credit not granted for this course and EBIO 2670.

**EBIO 2500-4. Introduction to Horticulture.** Lect. and lab. Covers the principles and techniques of plant science applied to cultivated plants. Emphasizes basic plant biology, aspects of the culture environment as variable, and the tools and technology used in culture, regulation, propagation, and protection. Includes a brief survey of the industries related to cultivated plants. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060.

**EBIO 2590-2. Plants and Society.** Acquaints students with the plants that are both essential and desirable to human survival, well-being, and quality of life. Topics include plants and world cultures, food plants, commercial products (beverages, extracts, herbs, and spices, etc.), cosmetics, textiles, wood products, medicinal plants, psychoactive plants, poisonous plants, plant used in horticulture and landscape architecture, wood products, musical instruments, etc.

**EBIO 2640-5. Honors Principles of Ecology.** Lect., lab, and rec. Introduces principles of ecology, emphasizing patterns and processes at various levels of biological organization. Scope global, but examples often from local environment. Lab emphasizes techniques of field biology. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240; or 1030, 1040, and 1050. Credit not granted for this course and EPOB 2050 or 2650 or 3020 or EBIO 2040.

**EBIO 2670-5. Honors Genetics: Molecules to Populations.** Lect., rec., and co-sem. Covers principles of genetics and developmental biology at levels of molecules, cellular organelles, individuals, and populations; asexual and sexual life cycles; and heredity. Recitations allow discussion of genetics problems and implications of genetic principles, and provide demonstrations and simulations of genetic processes. Honors co-seminar covers specific topics in more depth. Prereqs., EBIO 1210, 120, 1230, and 1240, or EPOB 2050 and 2060. Credit not granted for this course and EBIO 2070.

**EBIO 2840 (1-6). Independent Study (Sophomore).** May be repeated up to 6 total credit hours.

**EBIO 3010 (1-2). Teaching Biology.** Provides an opportunity to assist in teaching of specific laboratory section in EBIO under direct faculty supervision. Students must make arrangements with the faculty member responsible for the course in which they plan to assist. May be repeated up to 4 total credit hours.

**EBIO 3040-4. Conservation Biology.** Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques. Prereq., EBIO 2040 or 2640. Same as ENV5 3040.

**EBIO 3080-4. Evolutionary Biology.** Lect. and rec. Emphasizes the fundamental evolutionary concepts that provide explanations for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection, speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and processes. Recitations allow students to explore specific topics in more depth and smaller groups. Prereq., EBIO 1210 and 1220 or equivalent. Credit not granted for this course and EBIO 3680 or EPOB 2080 or 2680.

**EBIO 3110-3. Population and Community Ecology.** Presents principles of ecology that relate to the niche, population growth, metapopulations, population interactions (within and between trophic levels), community structure and development, landscape ecology and species diversity. Prereq., EBIO 2040 or 2640 or equivalent.

**EBIO 3170 (3-4). Arctic and Alpine Ecology.** Lect. and field trips. Focuses on the biology of arctic and alpine environments, limiting physical factors (such

as geomorphology and climatic history), and human interaction with cold-stressed environments, especially the arctic. Prereqs., EBIO 1210 and 1220, or EPOB 2050 and 2060.

**EBIO 3175-1. Arctic and Alpine Ecology Lab.** Examines alpine ecosystems and treeline relative to global change. Weekend (one-day) field trips into the Rocky Mountains, visits to Denver Museum of Nature and Science, and to CU herbarium/plant lab for experiential learning connected to EBIO 3170. Coreq., EBIO 3170. Pass/fail only.

**EBIO 3180-3. Global Ecology.** Lect. Involves study of ecological principles and problems at the biosphere level. Presents a worldwide approach to populations, biotic resources, ecologic interactions, land use, deforestation, desertification, species extinctions, pollution, environmental quality, global change, and environmental ethics. Prereqs., EBIO 1210 and 1220 or equivalent. Formerly EPOB 3180. Approved for arts and sciences core curriculum: natural science.

**EBIO 3190-3. Tropical Marine Ecology.** Lect. Examines the biology and ecology of marine ecosystems, emphasizing those occurring in tropical regions such as coral reefs. Studies how these ecosystems are changing and the future impact of human stress on the marine environment. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: natural science.

**EBIO 3240-4. Animal Behavior.** Lect. and lab. Topics include basic concepts and history, methods of study, ethical issues, neurobiology, behavior, the development of behavior, predator-prey relationships, communication, aggression and dominance, mating systems, cognitive ethology, and parental care. When possible, life-history strategies, the evolution of behavior, and behavioral ecology are stressed. Uses animals and animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Restricted to sophomores/juniors/seniors.

**EBIO 3270-3. Ecosystem Ecology.** Integrates information from physics (e.g., energetics), chemistry (the behavior of basic elements), and biology (evolutionary traits of species, multiple photosynthetic pathways, etc.) to understand the structure and functioning of ecosystems. Provides the background and necessary information to understand controls on photosynthesis, decomposition, and nutrient cycling across diverse terrestrial and aquatic landscapes. Prereqs., EBIO 1210, 1220, 1230, 1240, and 2040, or EPOB 2050 and 2060, or EBIO 3020.

**EBIO 3400-4. Microbiology.** Lect. and lab. Surveys distinguishing characteristics of microorganisms based on structural-functional relationships, taxonomy, growth, and physical-chemical agents of control including antibiotics, metabolism, and genetics. Introduces applied microbiology emphasizing infectious diseases, basic concepts of immunology, and microbial ecology. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060.

**EBIO 3470-3. History of Biology.** Lect. Surveys major themes in the development of biological theory from ancient times to present, emphasizing complimentary roles of observation, experiment, and technical innovation, and influence of general cultural environment on scientific advance. Prereqs., EBIO 1210 and 1220.

**EBIO 3630-4. Parasitology.** Lect. and lab. Surveys animal parasites, including life histories; emphasizes parasites of humans. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240 or EPOB 2050 and 2060.

**EBIO 3680-5. Honors Evolutionary Biology.** Lect., rec., and co-sem. Emphasizes the fundamental evolutionary concepts that provide explanation for the diversification of life on Earth. Specific topics include the evidence for evolution, adaptation by natural selection speciation, systematics, molecular and genome evolution, and macroevolutionary patterns and process. Recitations allow students to explore specific topics in more depth and smaller groups. Prereqs., EBIO 1210, 1220, 1230, 1240, 2070 or 2670. Credit not granted for this course and EBIO 3080 or EPOB 2080 or 2680.

**EBIO 3770-4. Animal Diversity: Vertebrates.** Lect. and lab. Provides a broad overview of the biology of vertebrates: evolution and systematics, morphology, physiology, behavior, ecology, and biogeography. Laboratories focus on the diversity of vertebrates, including adaptations and diagnostic features of

major groups. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent.

**EBIO 3840 (1-6). Independent Study (Junior).** May be repeated up to 6 total credit hours.

**EBIO 3850-4. Animal Diversity: Invertebrates.** Lect. and lab. Offers a broad study of the biology of the most diverse group of organisms on Earth. Areas include ecology, physiology, evolution and morphology of aquatic and terrestrial forms. This course uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent, or EPOB 2050 and 2060.

**EBIO 3870 (1-6). Independent Research (Junior).** May be repeated up to 6 total credit hours.

**EBIO 3930 (1-6). Internship.** Provides an academically supervised opportunity for upper-division students to work in public or private organizations. Projects are usually related to students' career goals. Each project has both academic and work components. May be repeated up to 6 total credit hours. Pass/fail only.

**EBIO 3940-3. Argument in Scientific Writing.** Emphasizes argumentative strategies used in scientific writing. Reviews essential writing skills to prepare students for academic and professional communication. Restricted to juniors and seniors. No biology credit for majors in EBIO. Approved for arts and sciences core curriculum: written communication.

**EBIO 3980-1. Seminar: Introduction to EBIO Honors.** Presents an introduction to the departmental Honors program. Consists of a lecture component on Honors research, thesis, and defense, as well as a seminar component where students present the findings of their library research, conducted under guidance of a faculty mentor, and hear presentations by graduating Honors candidates on their thesis research. Prereq., 3.2 or better GPA, declared EBIO major, and approval by departmental Honors program.

**EBIO 3990 (1-3). Introduction to EBIO Honors.** Provides an introduction to the departmental Honors program. Consists of individual library research on a potential Honors thesis topic under the guidance of a faculty mentor. Prereqs., 3.2 or better GPA, declared EBIO major, and approval by departmental Honors committee.

**EBIO 4020-3. Stream Biology.** Offers a geological, physical, chemical, and biological study of flowing water with special reference to streams and rivers as ecosystems. A laboratory course is offered (see EBIO 4150). Prereqs., EBIO 1210, 1220, 1230, 1240, and 2040, or EPOB 2050 and 2060. Same as EBIO 5020.

**EBIO 4030-3. Limnology.** Examines the ecology of inland waters, including a detailed consideration of physical, chemical, and biological properties of freshwater ecosystems: origins and major characteristics of lakes and streams, survey of chemical and nutrient cycles in freshwater habitats, and survey of biotic composition of freshwater environments. Important themes in modern freshwater ecology are considered, including energy flow, trophic structure, eutrophication, and management of freshwater ecosystems. Prereqs., EBIO 1210 and 1220. Same as EBIO 5030.

**EBIO 4060-3. Landscape Ecology.** Studies distributional patterns of communities and ecosystems, ecological processes that affect those patterns, and changes in pattern and process over time. Consideration of spatial and temporal scales in ecological analyses is required to understand and predict response to broad-scale environmental change. Prereqs., EBIO 1210, 1220, 1230, 1240, and EBIO 2040 or 2640, or EPOB 2050 and 2060. Same as EBIO 5070.

**EBIO 4090-2. Coral Reef Ecology.** Includes one week of lectures in Boulder and one week of field studies on one of the most complex and beautiful ecosystems in the world, the Caribbean reefs at Cozumel, Mexico. Two week, fall-semester course beginning after Christmas. Prereqs., EBIO 2040 and SCUBA certification. Restricted to sophomores/juniors/seniors.

**EBIO 4100-3. Advanced Ecology.** Emphasizes specific aspects of ecology based on specialties of faculty. One or more courses are offered most semesters. Topics have included dynamics of mountain ecosystems, tundra ecology, ethnoecology, population dynamics, tropical and insular biology, ecology of fishes, quantitative plant ecology, and arctic and alpine environments. May use animals and/or animal tissues. May be repeated twice provided the topics vary. Prereqs., EBIO 1210, 1220, 1230, 1240, and EBIO 2040 or 2640, or EPOB 2050 and 2060. Same as EBIO 5100.

**EBIO 4110-3. Advanced Ecology.** See EBIO 4100 for description. May use animals and/or animal tissues. May be repeated up to 9 total credit hours. Prereqs., EBIO 1210, 1220, 1230, 1240, and EBIO 2040 or 2640, or EPOB 2050 and 2060. Same as EBIO 5110.

**EBIO 4120 (2-4). Advanced Ecology.** See EBIO 4100 for description. May use animals and/or animal tissues. Prereq., EBIO 1210, 1220, 1230, 1240, and EBIO 2040 or 2640, or EPOB 2050 and 2060. Same as EBIO 5120.

**EBIO 4140-3. Plant Ecology.** Examines the relationships between plants and their physical and biological environments, encompassing physiology, competition, plant-soil and plant-animal interactions, population dynamics, diversity, and influence on ecosystem function. Prereqs., EBIO 1210, 1220, 1230, and 1240.

**EBIO 4150 (1-2). Techniques in Ecology.** Emphasizes application of modern ecological techniques, such as stream biology, aquatic biology, environmental measurement and control, and techniques in geocology. May be repeated up to 7 total credit hours. Prereqs., EBIO 1210, 1220, 1230, 1240, and EBIO 2040 or 2640, or EPOB 2050 and 2060. Same as EBIO 5150.

**EBIO 4160-3. Introduction to Biogeochemistry.** Covers fundamentals of biogeochemical cycling, emphasizing water, carbon, and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere, and hydrosphere; and natural and human-managed environments. Prereqs., GEOL 3320 or EBIO 3270, and CHEM 1011 or higher. Same as ENVS 4160 and GEOL 4160.

**EBIO 4175-3. The Scientific Basis for Ecosystem Management of Public Lands.** An advanced field ecology course emphasizing measurements, statistical procedures, and biotic data information management relevant to land management issues. Develops concepts of adaptive ecosystem management using ongoing field studies on public land in the Colorado Front Range. Prereqs., EBIO 3270 and 3500.

**EBIO 4180-3. Ecological Perspectives on Global Change.** Discusses evolutionary and recent geological history of modern environmental problems, using natural changes in climate, biotic diversity, drought, desertification, flood, forest destruction, etc., to show the range and frequency of such events as a perspective on modern reports. Prereq., minimum 14 hours of EBIO course work, including EBIO 2040, EPOB 2050 or 3020.

**EBIO 4290-3. Molecular Systematics and Evolution.** Reviews principles and theoretical foundations of molecular evolution and molecular systematics. Emphasizes hypothesis testing and using various methods of analysis for interpreting molecular variation in nature. Prereq., EBIO 3080 or instructor consent. Same as EBIO 5290.

**EBIO 4350 (1-4). Biological Field Studies.** Stresses broad areas of biology and employs field approaches. Uses animals and/or animal tissues. May be repeated up to 4 total credit hours. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Same as EBIO 5350.

**EBIO 4410-4. Biometry.** Lect. and lab. Offers a demanding, problems-oriented methods course in statistical inference procedures, assumptions, limitations, and applications emphasizing techniques appropriate to realistic biological problems. Includes data file management using interactive computing techniques. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Restricted to juniors/seniors. Same as EBIO 5410.

**EBIO 4460 (1-5). Special Topics.** Familiarizes students with specialized areas of biology. May be repeated up to 9 total credit hours. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent. Same as EBIO 5460.

**EBIO 4500-4. Plant Biodiversity and Evolution.** Lect. and lab. Surveys plant types emphasizing diagnostic features of plants in general and major taxa in particular. Focuses on identity, morphology, anatomy, reproduction, ecology, geography, evolution, fossil record, and economic use of taxa. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EBIO 3500.

**EBIO 4510-4. Plant Anatomy and Development.** Lect. and lab. Introduces structures of seed plants, especially angiosperms, and developmental history of these structures. Studies cell types, and their location and function in plant tissues and organs. The laboratory provides an opportunity to examine plant tissues and to prepare tissues for examination by the light microscope. Stresses role of plant structures in the living plant. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Formerly EBIO 3510.

**EBIO 4520-3. Plant Systematics.** Lect. and lab. Studies the principles and techniques of modern systematics of organisms, illustrated with examples from the plant kingdom, usually the angiosperms. Framework of course is evolutionary and ecological, as well as taxonomic. Prereq., EBIO 2070. Restricted to sophomores/juniors/seniors. Formerly EBIO 3520.

**EBIO 4530-4. Functional Plant Biology.** Lect. and lab. Explores mechanisms of plant functioning and how such functioning relates to the performance of the plant under different environmental conditions. Phenomena include water relations, growth and development, and metabolic processes including photosynthesis, respiration, and responses to stress. Prereqs., EBIO 1210, 1220, 1230, and 1240, or equivalent. Restricted to sophomores/juniors/seniors. Formerly EBIO 3530.

**EBIO 4550-4. Plant Eco-Evo-Devo.** Explores the fundamental principles of plant form from the perspectives of ecological function, evolutionary origin, and developmental dynamics. Students are presented with conceptual and analytical tools to interpret the vast diversity of growth form-function relationships that exist among plants. Laboratory sessions apply concepts presented in the lecture and students will engage in original research using light and scanning electron microscopy. Prereqs., EBIO 1210, 1220, 1230, or 1240.

**EBIO 4570-3. Advanced Plant Physiology.** Evaluates critically various concepts underlying the functioning of plants, including current controversial topics. Emphasizes the responses of plants to various environmental factors. Prereq., EBIO 3530. Restricted to sophomores/juniors/seniors. Same as EBIO 5570.

**EBIO 4630 (2-6). Field Techniques in Environmental Science.** Applies field and laboratory methods for assessing the abiotic and biotic environment. Emphasizes field techniques in climatology, surveying soils, hydrology, geomorphology, plant and animal ecology, and environmental law. Evaluation by written module reports and maps. This course may use animals and/or animal tissues. Prereqs., EBIO 2050 and instructor consent. Same as ENVS 4630.

**EBIO 4640 (2-4). Plant Field Studies.** Includes field-oriented courses offered at irregular intervals during the academic year or during summer sessions. May be repeated up to 7 total credit hours. Prereq., EBIO 2040 and 2640 or equivalent.

**EBIO 4660-4. Insect Biology.** Lect. and lab. Introduction to evolution, ecology, physiology, and behavior of insects. Emphasizes how insects have solved problems, such as maintaining water balance or finding food, that are shared by all animals but for which there may be unique solutions among the insects. Agricultural and human health problems relative to entomology are discussed. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Same as EBIO 5660.

**EBIO 4740-3. Biology of Amphibians and Reptiles.** Comparative morphology, taxonomy, ecology, behavior, and geographic distribution of amphibians and reptiles. This course uses animals and animal tissue. Prereqs., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Same as EBIO 5740 and PSYC 4740.

**EBIO 4750-4. Ornithology.** Lect., lab, and field trips. Presents origin, evolution, ecology, physical and behavioral characteristics, and taxonomy of orders and families of birds of North America; field work with local species emphasizing avian ecology. Uses animals and/or animal tissues. Prereq., EBIO 1210, 1220, 1230, and 1240, or EPOB 2050 and 2060. Same as EBIO 5750.

**EBIO 4760-4. Mammalogy.** Lect., lab, and field studies. Discusses origin, evolution and adaptation, geographic distribution, ecology, and taxonomy of mammals; field and laboratory study of Coloradan species. Uses animals and/or animal tissues. Prereq., EBIO 1210, 1220 and 2040 or 2640. Same as EBIO 5760.

**EBIO 4795-3. Museum Field Methods/Zoology and Botany.** Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates, and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods, and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts, and individual research projects. Same as EBIO 5795, MUSM 4795 and ENVS 4795.

**EBIO 4800-3. Critical Thinking in Biology.** Lect. and discussion. Explores controversial issues, historical themes, or emerging developments in biology. Consult the EBIO Undergraduate Advising Center for current listings. Different course sections on different topics may be repeated up to 12 total

credit hours. Prereq., minimum of 14 hours of EBIO course work. Restricted to sophomores/juniors/ seniors. Same as EBIO 5800.

**EBIO 4820-3. Scientific Honors Thesis Writing Seminar.** Provides advanced instruction in writing the scientific honors theses, emphasizing interpreting, analyzing, and arguing scientific data. Focuses on essential communication skills necessary for effective presentation of the thesis to a wide variety of audiences.

**EBIO 4840 (1-6). Independent Study (Senior).** May be repeated up to 6 total credit hours.

**EBIO 4860 (1-2). Critical Thinking in Biology: Lab.**

**EBIO 4870 (1-6). Independent Research (Senior).** May be repeated up to 6 total credit hours.

**EBIO 4980-1. Seminar: EBIO Honors Thesis.** To be taken during the final academic year prior to graduation. Consists of a lecture component on honors thesis writing and defense, as well as a seminar component where honors candidates present their thesis research in a practice defense talk. Prereq., 3.30 or better GPA, declared EBIO major, and approval by departmental honors committee.

**EBIO 4990 (1-3). EBIO Honors Thesis.** To be taken during the final academic year prior to graduation. Consists of the final phase of honors research and thesis preparation under the guidance of a faculty mentor. Prereq., 3.30 or better GPA, declared EBIO major, and approval by departmental honors committee.

**EBIO 5000-1. EBIO Colloquia.** All first year EBIO graduate students are required to attend the EBIO Colloquia Series. Speakers from around the world and within the department cover topics in all areas of biology. May be repeated up to 2 total credit hours.

**EBIO 5020-3. Stream Biology.** Same as EBIO 4020.

**EBIO 5030-3. Limnology.** Same as EBIO 4030.

**EBIO 5060-3. Landscape Ecology.** Same as EBIO 4060.

**EBIO 5100-3. Advanced Ecology.** Same as EBIO 4100.

**EBIO 5110-3. Advanced Ecology.** Same as EBIO 4110.

**EBIO 5120 (2-4). Advanced Ecology.** Same as EBIO 4120.

**EBIO 5150 (1-2). Techniques in Ecology.** Same as EBIO 4150.

**EBIO 5240-3. Advanced Topics in Animal Behavior.** Covers special areas of ethology such as sociobiology, animal communication, cognitive ethology, human ethology, moral and ethical issues. Prereq., EBIO 3240.

**EBIO 5290-3. Molecular Systematics and Evolution.** Same as EBIO 4290.

**EBIO 5310-3. Ecology and Conservation.** Reviews current research activities in the various fields of environmental biology, including population, community, behavioral, ecosystem, and landscape ecology, plus conservation biology and global change. Prereq., graduate standing.

**EBIO 5320-3. Current Topics in Evolutionary Biology.** Examines six major themes on contemporary evolutionary research: population genetics, natural selection and adaptation, molecular evolution, evolution and development, phylogenetic systematics, and macroevolution. Emphasizes recent primary literature and sophisticated mastery. Prereq., graduate standing in EBIO. Formerly EPOB 5320.

**EBIO 5350 (1-4). Biological Field Studies.** Same as EBIO 4350.

**EBIO 5410-4. Biometry.** Same as EBIO 4410.

**EBIO 5460 (1-5). Special Topics.** Same as EBIO 4460.

**EBIO 5570-3. Advanced Plant Physiology.** Same as EBIO 4570.

**EBIO 5660-4. Insect Biology.** Same as EBIO 4660.

**EBIO 5740-3. Biology of Amphibians and Reptiles.** Same as EBIO 4740 and PSYC 5740.

**EBIO 5750-4. Ornithology.** Same as EBIO 4750.

**EBIO 5760-4. Mammalogy.** Same as EBIO 4760.

**EBIO 5795-3. Museum Field Methods/Zoology and Botany.** Same as EBIO 4795 and MUSM 5795.

**EBIO 5800-3. Critical Thinking in Biology.** Same as EBIO 4800.

**EBIO 5820 (2-3). Graduate Writing Seminar.** Enhances writing proficiency, using graduate writing projects to implement the course concepts. Offers understanding of conventions and strategies used in scientific writing to prepare students for academic and professional communication. Prereqs., graduate standing and basic proficiency in English as a written language.

**EBIO 5840 (1-6). Independent Study (Master's Level).** Instructor consent required. May be repeated up to 6 total credit hours.

**EBIO 6000-1. Seminar: Introduction to Biological Research.** Discusses areas of biological research represented in EBIO. Required of all first-year graduate students in EBIO.

**EBIO 6100 (1-3). Seminar in Environmental Biology.** Instructor consent required. Restricted to graduate students. May be repeated up to 7 total credit hours. Same as EBIO 6120.

**EBIO 6120 (1-3). Seminar in Environmental Biology.** Same as EBIO 6100.

**EBIO 6200 (1-3). Seminar in Population Biology.** May be repeated up to 7 total credit hours. Same as EBIO 6210.

**EBIO 6210 (1-3). Seminar in Population Biology.** May be repeated up to 7 total credit hours. Same as EBIO 6200.

**EBIO 6300 (1-3). Seminar in Organismic Biology.** May be repeated up to 7 total credit hours.

**EBIO 6330-2. Seminar in Organismic Biology.** May be repeated up to 7 total credit hours.

**EBIO 6440-2. Remote Sensing Field Methods.** Explores theory and practical field measurements for validation of airborne and spaceborne spectral image acquisition. Emphasizes radiative scattering properties of soil, vegetation, cryosphere, and atmosphere. Characterization and calibration of instrumentation used to measure these properties. Prereq., GEOL/GEOG 4093/5093. Recommended prereq., GEOL 5240. Same as GEOG 6443.

**EBIO 6840 (1-7). Independent Research (Master's Level).** Instructor consent required. May be repeated up to 7 total credit hours.

**EBIO 6940 (1-6). Master's Degree Candidate: Plan II.** Prereq., instructor consent.

**EBIO 6950 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours. Prereq., instructor consent.

**EBIO 7840 (1-6). Independent Study (Doctoral Level).** May be repeated up to 6 total credit hours.

**EBIO 8840 (1-6). Independent Research (Doctoral Level).** May be repeated up to 6 total credit hours.

**EBIO 8990 (1-10). Doctoral Dissertation.** Prereq., instructor consent.

## Economics

### Theory and History of Economic Thought

**ECON 1000-4. Introduction to Economics.** Introduces an economic way of thinking, emphasizing its critical importance in cases where people want to make themselves as well off as possible, but can't have everything they want. Focuses on how economic thought affects all choices. Topics include scarcity, decision making, and markets. Students may not receive credit for ECON 1000 or 1001 if they have received credit for ECON 2010 or 2020. Similar to ECON 1001, 2010, and 2020. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 2010-4. Principles of Microeconomics.** Examines basic concepts of microeconomics, or the behavior and the interactions of individuals, firms, and government. Topics include determining economic problems, how consumers and businesses make decisions, how markets work and how they fail, and how government actions affect markets. Credit not granted for this course and ECON 1000 and 1001. Meets MAPS requirements for social sciences: general. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 2020-4. Principles of Macroeconomics.** Provides an overview of the economy, examining the flows of resources and outputs and the factors de-

termining the levels of income and prices. Explores policy problems of inflation, unemployment, and economic growth. Prereq., ECON 2010. Credit not granted for this course and ECON 1000 and 1001. Meets MAPS requirement for social sciences: general.1000, Approved for arts and sciences core curriculum: contemporary societies.

**ECON 3070-3. Intermediate Microeconomic Theory.** Explores theory and application of models of consumer choice, firm and market organization, and general equilibrium. Extensions include intertemporal decisions, decisions under uncertainty, externalities, and strategic interaction. Prereqs., ECON 1000 or 2010; and either ECON 1078 and 1088, or MATH 1300, or MATH 1310, or MATH 1081, or MATH 1080, 1090, and 1100, or APPM 1350, or equivalent.

**ECON 3080-3. Intermediate Macroeconomic Theory.** Introduces theories of aggregate economic activity including the determination of income, employment, and prices; economic growth; and fluctuations. Macroeconomic policies are explored in both closed and open economy models. ECON 3070 and 3080 may be taken in any order; there is no recommended sequence. Prereqs., ECON 1000 or 2020; and either ECON 1078 and 1088, or MATH 1300, or MATH 1310, or MATH 1081, or MATH 1080, 1090, and 1100, or APPM 1350, or equivalent.

**ECON 4070-3. Topics in Microeconomics.** Studies utility maximization under uncertainty, risk, game theory, moral hazard, and adverse selection. Applications include insurance markets and the theory of contracts. Prereqs., ECON 3070 and 4808 or equivalent, or instructor consent.

**ECON 7010-3. Microeconomic Theory 1.** Analyzes recent and contemporary literature on fundamentals of economic theory. Considers value theory with particular emphasis on methodology, theory of demand, theory of the firm, game theory, theory of distribution, general equilibrium theory, and welfare economics. Prereqs., ECON 3070, 3080, 6808 or MATH 1300.

**ECON 7020-3. Macroeconomic Theory 1.** Discusses behavior of consumption, investment, employment, production, and interest rates in the context of dynamic optimization models. Also considers government, economic growth, and business cycles. Prereqs., ECON 3070 and 3080.

**ECON 7030-3. Microeconomic Theory 2.** Continuation of ECON 7010. Prereq., ECON 7010.

**ECON 7040-3. Macroeconomic Theory 2.** Presents the theoretical and empirical application of dynamic macro programming models. Topics include consumption, investment, labor, money, and credit theories. Covers the theory of economic fluctuations and business cycles employing dynamic general equilibrium models. Prereq., ECON 7020.

**ECON 7050-3. Advanced Economic Theory.** Discusses advanced topics in game theory and general equilibrium. Prereqs., ECON 7010, 7030, 7818, 7828.

## Money and Banking

**ECON 4111-3. Money and Banking Systems.** Discusses money, financial institutions and the monetary-financial system in a modern economy. Prereq., ECON 3080.

## Public Economics

**ECON 4211-3. Economics of the Public Sector.** Focuses on taxation and public expenditures. Topics include economic rationale for government action, economic theory of government behavior, and effects of government policies on allocation of resources and distribution of income. Prereqs., ECON 3070 and 3818.

**ECON 8211-3. Public Economics: Fundamental Principles.** Presents the fundamental principles of public goods, externalities, public choice, excess burden, optimal taxation, and tax incidence. Prereq., ECON 6211 or 7010.

**ECON 8221-3. Public Economics: Topics in Public Expenditures and Taxation.** Explores advanced topics in public economics such as decentralization, state and local government, program analysis, taxation, international tax issues, political economy issues, and market failure. Prereqs., ECON 6211 or 7010, and 8211.

**ECON 8231-3. Local Public Economics.** Examines subnational governments and systems of governments, the effects of inter-governmental competition, appropriate tax and expenditure responsibilities, and variations in governing

institutions. Covers congestible public goods, Tiebout mechanisms, and tax capitalization. Prereq., ECON 6211 or 7010.

## Urban and Regional Economics

**ECON 4292-3. Migration, Immigrant Adaptation, and Development.** Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society. Recommended prereqs., GEOG 1982, 1992, 2002, or 2412. Same as GEOG 4292.

**ECON 8252-3. Seminar: Urban and Regional Economics 1.** Covers basic theories in spatial location of economic activity and land use and the survey techniques developed to analyze, measure, and predict regional and urban structure and growth, such as economic base studies, regional social accounts, and input-output analysis. Prereq., ECON 6070 or 7010.

**ECON 8262-3. Topics in Urban and Regional Economics.** Investigates various theoretical topics in urban and regional economics, focusing on policy issues. Involves student research and presentations. Prereq., ECON 6070 or 7010.

## International Trade and Finance

**ECON 3403-3. International Economics and Policy.** Examines national and supranational policies that affect the international economy, with attention to trade barriers, economic nationalism and regionalism, international political economy, exchange market intervention, and international transmission of economic perturbations. Prereqs., ECON 1000, or ECON 2010 and 2020. Restricted to nonmajors. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 4413-3. International Trade.** Focuses on theories of international trade and its impacts on economic welfare. Analyzes commercial policy, including tariffs, non-tariff barriers, retaliation, regional integration, and factor migration. Prereq., ECON 3070.

**ECON 4423-3. International Finance.** Covers balance of payments; foreign exchange market, income, trade, and capital flows; asset markets adjustment mechanisms; stabilization policies in an open economy; and problems of international monetary systems. Prereq., ECON 3080.

**ECON 8333-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as PSCI 7333, SOCY 6031, and GEOG 5332.

**ECON 8413-3. Seminar: International Trade Theory.** Covers theories of comparative advantage, including the classical, factor-proportions, fixed-factor, and noncompetitive markets models. Examines trade policy including trade barriers, market distortions, strategic policy, regional integration, political economy, and factor migration. Prereq., ECON 6413 or 7010.

**ECON 8423-3. Seminar: International Finance.** Highlights foreign exchange markets, past and current international monetary mechanisms, and processes of adjustment. Examines the role of international financial markets for the behavior of consumption, investment, saving, and production. Also considers international transmission of business cycles. Prereq., ECON 6423 or 7020.

**ECON 8433-3. Seminar: Topics in Money and International Economics.** Explores advanced work in various aspects of international economics, such as empirical trade analysis, public choice, and interactions between real and monetary phenomena in the world economy. Prereq., ECON 6413, 6423, 8413, or 8423.

## Economic History

**ECON 4504-3. The New Institutional Economics: Institutions, Contracts, and Economic Outcomes.** Understand the conceptual toolkit of the New Institutional Economics. The concepts include transaction costs, property rights,

credible commitment, and most importantly the roles of formal and informal institutions. We will examine the impact of institutions on contracting and organizations. The goal is to understand how the underlying institutions determine the degree to which societies improve their economic performance. Prereqs., ECON 3070, 3080 and 3818.

**ECON 4514-3. Economic History of Europe.** Covers evolution of modern economic growth and development in Europe, emphasizing institutional change. Prereqs., ECON 3070 or 3080. Approved for arts and sciences core curriculum: historical context.

**ECON 4524-3. Economic History of the United States.** Evolution of modern economic growth and development in the U.S. from colonial times to the present emphasizing institutional change. Prereq., ECON 3070. Approved for arts and sciences core curriculum: United States context.

**ECON 8534-3. Economic History of North America.** Examines North America's past from the perspective of economics. Topics include growth and welfare in the colonial period; staple products, agricultural development, and the emerging industrialism in the antebellum period; transformation of the North American economy to 1914; the interwar years and the Great Depression; and economic integration since 1945. Prereqs., ECON 6070 and 6080, or ECON 7010.

**ECON 8764-3. History of Economic Development.** Covers in historical perspective the causes of economic development including why some areas develop faster than others and why development occurs more rapidly in some eras than others. Prereqs., ECON 6070 and 6080, or ECON 7010. Same as HIST 7214.

## Economic Development

**ECON 3784-3. Economic Development and Policy.** Introductory course in Economic Development, designed for non-majors. Students are introduced to the major issues in development economics. Students will explore empirical, theoretical, and policy issues in economic development. Emphasis is placed on the controversial issues in this literature, requiring students to explore competing, and often conflicting, perspectives of these issues. Prereqs., ECON 1000 or ECON 2010 and 2020. Restricted to non-majors.

**ECON 4774-3. Economic Reform in Developing Countries.** Explores competing paradigms of economic development, emphasizing the confrontation between the structuralist/dirigiste paradigm and the neoclassical public choice paradigm. Analyzes economic reforms under way in developing countries, including stabilization policy and structural adjustment. Also explores political reforms, including the pluralist revolution and the design of a constitutional framework in developing societies. Prereqs., ECON 3070 or 3080.

**ECON 4784-3. Economic Development.** Explores empirical, theoretical, and policy issues in economic development. Examines topics with reference to the developing countries: income distribution and poverty, demographic change, labor force employment and migration, human capital, physical capital, natural resources and the environment, industrial structure, international trade, and finance. Prereqs., ECON 3070 or 3080.

**ECON 4794-3. Economic Growth.** Introduces theories explaining why differences in standards of living among countries are so large. Examines a variety of data on historical experiences of economic growth. Surveys recent research on why some countries are so rich and some are so poor, and why some countries grow so quickly and others grow so slowly. Prereqs., ECON 1088 or equivalent, and ECON 3070 or 3080.

**ECON 6774-3. Economic Reform in Developing Countries.** Covers stabilization policy and structural adjustment. Specific topics include orthodox stabilization policies (fiscal, monetary, and exchange rate policies); heterodox stabilization policies (price, wage, and interest controls); trade liberalization; financial liberalization; privatization and deregulation. Prereqs., ECON 6070 and 6080. Will not be offered academic year 2008-09.

**ECON 8774-3. Seminar in Transition Economies.** Focuses on the problems encountered in countries evolving from planned to market economies. Emphasizes applications of new and traditional models of economic growth and analysis of problems unique to formerly planned economies. Prereq., ECON 6774 or 7010.

**ECON 8784-3. Economic Development.** Explores empirical, theoretical, and policy issues in economic development. Examines political economy, income

distribution and poverty, demographic change, labor force employment and migration, human capital, physical capital, natural resources and the environment, industrial structure, international trade and finance, stabilization policy, and structural adjustment. Prereqs., ECON 6774 or 7010.

## Natural Resources and Environmental Economics

**ECON 3535-3. Natural Resource Economics.** Integrates economic analysis with life science aspects of natural resource systems to develop social policies for use of natural resources. Studies economists' approaches to resources policy analysis and applies them to energy, forestry, fisheries, mineral, and water systems. Prereq., ECON 1000 or 2010. Restricted to nonmajors. Credit not granted for this course and ECON 4535. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 3545-3. Environmental Economics.** Highlights causes of excessive environmental pollution and tools for controlling it through economic analysis, values of preservation, and distribution of costs and benefits from environmental protection programs. Prereq., ECON 1000 or 2010. Restricted to nonmajors. Credit not granted for this course and ECON 4545. Approved for arts and sciences core curriculum: contemporary societies.

**ECON 4535-3. Natural Resource Economics.** Analysis of problems associated with socially optimal use of renewable and nonrenewable natural resources over time. Problems of common property resources, irreversible forms of development, and preservation of natural areas. Prereq., ECON 3070. Credit not granted for this course and ECON 3535.

**ECON 4545-3. Environmental Economics.** Examines the effects of economic growth on the environment; application of economic theory of external diseconomies, cost-benefit analysis, program budgeting, and welfare economics to problems of the physical environment. Prereq., ECON 3070. Credit not granted for this course and ECON 3545.

**ECON 4555-3. Transportation Economics.** Provides an overview of the characteristics and structure of transportation markets including aggregate demand, vehicle and mode choice, surface freight and air travel. Explores market failures in the transportation sector including market power and externalities such as pollution, congestion and accidents as well as policies aimed at addressing these issues. Prereqs., ECON 3070 and 3818.

**ECON 6555-3. Water Resources Development and Management: Technology, Economics, Institutions.** Offers a multidisciplinary exploration of the engineering, economic, and institutional principles involved in water system development and management. Provides a background in basic hydrology, economics, water law, and institutions. Prereq., ECON 3070 or equivalent. Same as CVEN 5393.

**ECON 8535-3. Environmental Economics I.** Considers the allocation of society's scarce environmental resources and government attempts to achieve more efficient and equitable allocations. It is a course in applied welfare economics with an emphasis on market failure and valuation. Prereq., ECON 6535 and 6808; or ECON 7010.

**ECON 8545-3. Environmental Economics II.** Provides advanced study of recent advances in environmental economics and explores opportunities for new research. Topics vary with interests of instructor and students. Prereqs., ECON 6535 and 6808, or ECON 7010 and ECON 8535.

**ECON 8555-3. Water Resources Development and Management.** Offers a research seminar in joint hydrologic-economic modeling and systems analysis. Addresses problems of joint water quantity-water quality management and joint surface-ground water management. Prereq., ECON 6555.

## Labor and Human Resources

**ECON 4616-3. Labor Economics.** Examines the influence of markets, unions, and government on labor allocation and remuneration. Analyzes human capital, discrimination, mobility and migration, productivity, unemployment, and inflation. Compares outcomes under competition with those in a world marked by shared market power and bargaining. Prereq., ECON 3070.

**ECON 4626-3. The Economics of Inequality and Discrimination.** Examines the unique insights available through economic analysis regarding the causes,



mechanisms, and consequences of inequality and discrimination. Examines the extent of inequality, the varieties and extents of discrimination, and explores the economic models that suggest explanations. Prereq., ECON 3070. Approved for arts and sciences core curriculum: human diversity.

**ECON 4646-3. Topics in Health Economics.** Encourages students to read, think, and do research on issues in health economics. Covers issues that are pertinent to the U.S. and other developed and developing countries. Covers the basics of health economics such as health production functions and the role for government and touches on topical issues such as health care reform. Prereq., ECON 3070. Recommended prereq., ECON 3818.

**ECON 8666 (1-3). Economic Demography.** Investigates economic determinants and consequences of demographic behavior in developing and developed countries. Issues include fertility and female labor supply interactions, the demographic transition, the effect of population growth on income distribution, family investments in children, and intergenerational mobility. Prereqs., ECON 3070 and 3080.

**ECON 8676-3. Seminar: Labor Economics 1.** Focuses on the demand side of labor markets. Topics include standard static and dynamic models of labor demand, labor market discrimination, composition of compensation, labor hierarchies within enterprises, unionization, efficient contracts, and macroeconomics of labor markets. Prereq., ECON 6070 or 7010.

**ECON 8686-3. Seminar: Labor Economics 2.** Focuses on special topics in labor economics: dynamic theories of labor supply, employment, and unemployment; labor supply in a household framework; and labor market activity and income distribution. Explores both theoretical models and empirical tests in each area. Prereq., ECON 6070 or 7010.

## Industrial Organization

**ECON 4697-3. Industrial Organization and Regulation.** Explores neoclassical theory of the firm, the determinants of industrial structure, and the purposes and institutions of public policy to control or maintain a competitive environment. Prereq., ECON 3070. Approved for arts and sciences core curriculum: United States context.

**ECON 8747-3. Industrial Organization Theory.** Highlights economics of regulation of industry and markets, industry studies, and the application of lab methods to industrial organization. Prereq., ECON 7010.

**ECON 8757-3. Industrial Organization and Public Policy.** Addresses the theory of interaction of firms within markets and industries, emphasizing importance of the number, relative size of firms, market institution, firm strategies, and nature of consumer demand. Examines neoclassical and game theoretic models, empirical industry studies, and laboratory tests of theoretical models and policies. Prereq., ECON 7010.

## Quantitative Economics

**ECON 1078-3. Mathematical Tools for Economists 1.** Teaches mathematical skills and logical thinking for use in economics. Topics include algebra, graphs, functions, and probability. The class includes many “real world” examples and some illustrative computer assignments. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**ECON 1088-3. Mathematical Tools for Economists 2.** Continuation of ECON 1078. Teaches mathematical skills for use in economics. Topics include derivatives, optimization, and integration. These skills are used on “real world” problems, and illustrated with computer assignments. Prereq., ECON 1078 or instructor consent. Similar to MATH 1080, 1081, 1090, 1100, 1300, 1310, and APPM 1350.

**ECON 3818-4. Introduction to Statistics with Computer Applications.** Introduces statistical methods and their applications in quantitative economic analysis. Prereqs., ECON 1000, or 2010 and 2020; and either ECON 1078 and 1088, or MATH 1300, or MATH 1310, or MATH 1081, or MATH 1080, 1090, and 1100, or APPM 1350, or equivalent.

**ECON 4808-3. Introduction to Mathematical Economics.** Introduces the use of mathematics in economics. Topics include vectors and matrices, differential calculus, and optimization theory, with economic applications. Prereqs., ECON 3070 and ECON 3818.

**ECON 4818-3. Introduction to Econometrics.** Provides undergraduate economics majors with an introduction to econometric theory and practice. Develops the multiple regression model and problems encountered in its application in lecture and individual applied projects. Prereqs., ECON 3070 and 3818.

**ECON 4838-3. Microcomputer Applications in Economics.** Addresses innovative uses of personal computers in economic analysis and model building techniques. Acquaints students with economic models through individualized, computer-generated exercises. Topics include input-output analysis, linear programming, nonlinear approximation, and simulation. Prereqs., ECON 1088 or MATH 1300, ECON 3070 and ECON 3818.

**ECON 4848-3. Applied Econometrics.** Introduces students to the practice of applied regression analysis. Summarizes and reviews the regression technique, explores U.S. census data sources, introduces an advanced statistical software package and provides structured exercises in regression analysis of census data. Concludes with independent research projects analyzing social and economic issues using regression analysis and census data. Prereq., ECON 3818. Recommended prereq., ECON 3070.

**ECON 6828-3. Applied Time Series Analysis (Box-Jenkins) and Forecasting.** Introduces first-year graduate students to time series approach of model building and forecasting. Basic topics are autoregressive integrated moving average models, nonstationarity and co-integration, vector autoregressions, and the evaluation of forecasts from such models. Emphasizes applied computer assignments. Prereqs., ECON 3818 and 4808, or equivalent. Will not be offered academic year 2008–09.

**ECON 7818-3. Mathematical Statistics for Economists.** Provides the mathematical foundation for Ph.D. level statistical inference in economic research. The primary topics of the course are probability theory and mathematical statistics including hypothesis testing and classical estimation with an emphasis on the method of maximum likelihood.

**ECON 7828-3. Econometrics.** Continuation of ECON 7818. Topics include regression analysis and extensions of the linear regression model to generalized least squares, time series data, and systems of equations. Prereq., ECON 7818.

**ECON 8828-3. Seminar: Econometrics 1.** First semester of two-semester sequence in econometrics for PhD students. Studies least squares and generalized least squares estimation of linear econometric models. Asymptotic (large sample) theory of inference. Some topics in the estimation of microdata. Prereq., ECON 7818.

**ECON 8838-3. Seminar: Econometrics 2.** Teaches the advanced level of econometrics theory. Topics include asymptotic theory, maximum likelihood estimation, limited dependent variables analysis and other frontier areas of econometrics such as the method of moment estimation, semiparametric and nonparametric estimation procedure. Prereq., ECON 7828.

**ECON 8848-3. Applied Microeconomics.** Presents a “user’s guide” to conducting empirical research in applied microeconomics. Begins with a primer on an industry-standard econometric software package including programming techniques and data management. Introduces advanced econometric techniques including panel data methods, IV, matching models, regression discontinuity, and limited dependent variables models. Concludes with a research project requiring a replication and/or extension of an existing published paper. Prereqs., ECON 7818 and 7828.

## Independent Study and Other Courses

**ECON 4309-3. Economics Honors Seminar 1.** For information consult the department’s director of honors. Open only to qualified seniors.

**ECON 4339-3. Economics Honors Seminar 2.** For information consult the department’s director of honors. This course does not count toward major requirements. Prereq., ECON 4309. Open only to qualified seniors.

**ECON 4909-3. Independent Study.** May be repeated up to 6 total credit hours, but only 3 credit hours count for economics major. Prereqs., ECON 1000 or 2010 and 2020; completion of at least 12 hours of ECON classes and instructor and department consent required. Offered only to students with a GPA of 3.00 or better.

**ECON 4939 (2-6). Internship/Seminar.** Offers students the opportunity to integrate theoretical concepts of economics with practical experience in eco-

nomics-related institutions. The theoretical portion arises from seminars and readings, the practical from activities in organizations related to the economics field. A maximum of 3 credit hours counts toward major requirements. Prereqs., ECON 3070 and 3080; junior or senior major standing; and instructor consent.

**ECON 4999-3. Economics in Action: A Capstone Course.** Students read current periodicals, picking out topics in which economics plays a role in understanding events. Background reading is assigned on topics chosen. May not be taken more than once for credit. Prereqs., ECON 3070 and 3080, and junior or senior standing.

**ECON 6949 (1-3). Master's Candidate.** Will not be offered academic year 2008-09.

**ECON 6959 (1-6). Master's Thesis.** Will not be offered academic year 2007–08.

**ECON 8209-3. Economics Research Methods Workshop 1.** Assists students starting their doctoral thesis by discussing methodology and evaluation of economic research. Presents and discusses student research proposals. Prereqs., two ECON courses at the 8000 level.

**ECON 8219-3. Economics Research Methods Workshop 2.** Continuation of ECON 8209. Assists students starting their doctoral thesis by discussing relevant economic research. Presents and discusses research papers. Prereq., ECON 8209.

**ECON 8909 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., instructor and department consent.

**ECON 8999 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## English

### General Literature and Language

**ENGL 1260-3. Introduction to Women's Literature.** Introduces literature by women in England and America. Covers both poetry and fiction and varying historical periods. Acquaints students with the contribution of women writers to the English literary tradition and investigates the nature of this contribution. Same as WMST 1260. Approved for arts and sciences core curriculum: human diversity.

**ENGL 1500-3. Masterpieces of British Literature.** Introduces students to a range of major works of British literature, including at least one play by Shakespeare, a pre-20th century English novel, and works by Chaucer and/or Milton. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 1600-3. Masterpieces of American Literature.** Enhances student understanding of the American literary and artistic heritage through an intensive study of a few centrally significant texts, emphasizing works written before the 20th century. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 1800-3. American Ethnic Literatures.** Introduces significant fiction by ethnic Americans. Explores both the literary and the cultural elements that distinguish work by these writers. Emphasizes materials from Native American, African American, and Chicano traditions. Approved for arts and sciences core curriculum: human diversity.

**ENGL 1840 (1-3). Independent Study: Lower Division.** Creative writing. May be repeated up to 8 total credit hours.

**ENGL 1850 (1-3). Independent Study: Lower Division.** Literature/language. May be repeated up to 8 total credit hours.

**ENGL 2000-3. Literary Analysis.** Provides a basic skills course designed to equip students to handle the English major. Emphasizes critical writing and the acquisition of basic techniques and vocabulary of literary criticism through close attention to poetic and prose language. Required for students who declared the major summer 1999 and thereafter. Restricted to English majors only. Credit not granted for this course and ENGL 1010.

**ENGL 2010-3. Introduction to Literary Theory.** Introduces students to a wide range of critical theories that English majors need to know. Covers major movements in modern literary/critical theory, from Matthew Arnold through

new criticism to contemporary postmodern frameworks. Required for all English majors. Restricted to English majors only.

**ENGL 2030-3. Introduction to Digital Media in the Humanities.** Serves as a humanities-based introduction to digital media structures such as digital archive and reading/writing software; studies theories and methodologies for undertaking digital media scholarship in the humanities; and explores digital textualities ranging from text messaging, blogging, and game to digital fiction and poetry.

**ENGL 3000-3. Shakespeare for Nonmajors.** Introduces students to Shakespeare's major works: the histories, comedies, and tragedies. May include the nondramatic poetry as well. Prereq., sophomore standing. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 3060-3. Modern and Contemporary Literature.** Close study of significant 20th century poetry, drama, and prose works. Readings range from 1920s to the present. Prereq., sophomore standing. Approved for arts and sciences core curriculum: literature and the arts.

**ENGL 3930 (1-3). Internship.** Provides academically supervised opportunity for upper-division students to work in public or private organizations on projects related to students' career goals and to relate classroom theory to practice. May be repeated up to 6 total credit hours. Prereq., junior standing and instructor consent.

**ENGL 3940 (1-3). Service Learning Practicum.** Under faculty supervision, students participate in a service project correlated with the academic subject. May be repeated up to 6 total credit hours.

**ENGL 4250-3. Modern and Contemporary Novel.** Close study of masterpieces by such novelists as Proust, Joyce, Woolf, Lawrence, Mann, Kafka, and Faulkner. Prereq., junior standing.

**ENGL 4460-3. Modern Poetry.** Selects works of British and American poets from 1900 to the present. Prereq., junior standing.

**ENGL 4820-3. Honors Seminar.** Prepares prospective honors students to write honors theses. Focuses on sharpening the skills needed to write a successful thesis, including research techniques and the ability to evaluate and respond to secondary materials. May not be repeated. Prereq., instructor consent. Restricted to junior and senior English majors.

**ENGL 4830-3. Honors Thesis.**

**ENGL 4840 (1-3). Independent Study: Upper Division.** Creative writing. May be repeated up to 8 total credit hours.

**ENGL 4850 (1-3). Independent Study: Upper Division.** Literature/language. May be repeated up to 8 total credit hours.

### Undergraduate Writing

**ENGL 1001-3. Freshman Writing Seminar.** Provides training and practice in writing. Focuses on the writing process, the fundamentals of composition, and the structure of argument. Provides numerous and varied assignments with opportunity for revision. Prereqs., College of Arts and Sciences freshman or sophomore standing. Not open to business or engineering majors. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: lower-division written communication.

**ENGL 1191-3. Introduction to Creative Writing.** Introduces techniques of fiction and poetry. Student work is scrutinized by the instructor and may be discussed in a workshop atmosphere with other students. May not be taken concurrently with ENGL 2021 or 2051. May not be repeated. Not open to graduate students.

**ENGL 2021-3. Introductory Poetry Workshop.** Introductory course in poetry writing. May be repeated up to 9 total credit hours. Prereq., ENGL 1191 (min. grade B-), or equivalent transfer course work.

**ENGL 2051-3. Introductory Fiction Workshop.** Introductory course in fiction writing. May be repeated up to 9 total credit hours. Prereq., ENGL 1191 (min. grade B-), or equivalent transfer course work.

**ENGL 3021-3. Intermediate Poetry Workshop.** Intermediate course in poetry writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (five to seven poems).

**ENGL 3051-3. Intermediate Fiction Workshop.** Intermediate course in fiction writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (one short story).

**ENGL 3081-3. Intermediate Nonfiction Workshop.** Discussion and practical criticism of student work and discussion of relevant works of literary nonfiction. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript.

**ENGL 4021-3. Advanced Poetry Workshop.** Advanced course in poetry writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (five to seven poems).

**ENGL 4051-3. Advanced Fiction Workshop.** Advanced course in fiction writing. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript (one short story).

**ENGL 4071-3. Scriptwriting Workshop.** Designed to give students practical criticism of their script writing and technical format requirements. Either stage plays or screenplays are studied, as announced. May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript. Same as FILM 4075.

**ENGL 4081-3. Playwriting.** May be repeated up to 9 total credit hours. Prereq., CRW major or instructor consent based on submission of manuscript.

## Backgrounds to Literature in English

**ENGL 2222-3. Foundations of British and American Literature.** Studies major texts of medieval and Renaissance writers who fundamentally influenced the course of English writing. Ordinarily deals with Chaucer, Shakespeare, and Milton, though other classical, medieval, and Renaissance authors may be substituted.

**ENGL 2502-3. British Literary History 1.** Provides a chronological study of great figures and forces in English literature from Beowulf to 1660. Students may not receive credit for both ENGL 2502 and 3503.

**ENGL 2512-3. British Literary History 2.** Provides a chronological study of great figures and forces in English literature from 1660 to the present. Credit not granted for this course and ENGL 3512 and 3513.

**ENGL 2602-3. Introduction to Western European Literature 1.** Close study of literary classics of Western civilization: the *Odyssey* or *Iliad*, Greek drama, and several books of the Bible.

**ENGL 2612-3. Introduction to Western European Literature 2.** Close study of literary classics of Western civilization: major Roman and medieval texts.

**ENGL 3302-3. Backgrounds of English and American Literature.** Studies literary, philosophic, and religious traditions of the Greco-Roman and Judeo-Christian worlds, with close analysis of major texts in translation. Compares ancient and modern texts where feasible. Prereq., sophomore standing. Restricted to English and humanities majors.

**ENGL 3312-3. The Bible as Literature.** Surveys literary achievements of the Judeo-Christian tradition as represented by the Bible. Restricted to sophomores/juniors/seniors. Same as JWST 3312.

## British Literature to 1660

**ENGL 3543-3. Chaucer: *Troilus* and the Early Poems.** Close reading of Chaucer's work before *The Canterbury Tales*, with special emphasis on *Troilus* and *Criseyde* and its sources. Prereq., sophomore standing.

**ENGL 3553-3. Chaucer: *The Canterbury Tales*.** Short introduction to Middle English precedes study of the poetry. Prereq., sophomore standing. Restricted to English and humanities majors only.

**ENGL 3563-3. Early Shakespeare.** Shakespeare's works through 1600. Prereq., junior standing. Restricted to English, humanities, and theatre majors only.

**ENGL 3573-3. Later Shakespeare.** Shakespeare's works after 1600. Prereq., junior standing. Restricted to English, humanities, and theatre majors only.

**ENGL 3583-3. Milton.** Milton's poetry and selected prose. Prereq., sophomore standing. Restricted to English and humanities majors only.

**ENGL 4113-3. History and Culture of Medieval England.** Explores the major historical, literary, and cultural developments in England from the Anglo-

Saxon period through the 15th century. Prereq., junior standing. Approved for arts and sciences core curriculum: historical context.

**ENGL 4503-3. Continental Medieval Literature.** Intensive study of the major literary works of the Middle Ages in Europe. Prereq., junior standing.

**ENGL 4513-3. British Medieval Literature.** Intensive study of the major literary works of the Middle Ages in Britain. Prereq., junior standing.

**ENGL 4523-3. The Renaissance in England: 1500–1600.** Selected prose and non-dramatic poetry from Skelton and More through Shakespeare and his contemporaries. Prereq., junior standing.

**ENGL 4533-3. The Renaissance in England: 1600–1700.** Selected prose and poetry by Donne, Jonson, Bacon, and their successors. Prereq., junior standing.

**ENGL 4583-3. Elizabeth I and Her Times.** Interdisciplinary course explores different aspects of the reign of Elizabeth I: social and political history; literature; theater; and music. Explores the role and impact of a female ruler on English culture. Restricted to juniors and seniors. Same as HIST 4134 and THTR 4091.

## British Literature after 1660

**ENGL 3164-3. History and Literature of Georgian England.** Provides an interdisciplinary study of England in one of its most vibrant cultural and historical periods. Topics include politics, religion, family life, and the ways contemporary authors understood their world. Prereq., sophomore standing. Same as HIST 4164. Approved for arts and sciences core curriculum: historical context.

**ENGL 4204-3. Development of the English Novel 1.** From the beginnings to 1830. Prereq., junior standing.

**ENGL 4214-3. Development of the English Novel 2.** Continuation of ENGL 4204. Prereq., junior standing.

**ENGL 4224-3. Modern British and Irish Novel.** Studies major figures and trends in the 20th century. Prereq., junior standing.

**ENGL 4544-3. The Age of Satire: 1660–1740.** Dryden, Defoe, Swift, Pope, Addison, Steele, and their contemporaries. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4554-3. The Age of Sense and Sensibility: 1740–1800.** Gray, Johnson, Goldsmith, Boswell, Cowper, Burns, Blake, and their contemporaries. Prereq., junior standing.

**ENGL 4564-3. The Early Romantics.** Major emphasis on Blake, Coleridge, and Wordsworth. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4574-3. The Later Romantics.** Major emphasis on Keats, Shelley, and Byron. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4604-3. The Early Victorians.** Main currents of Victorian thought in prose and poetry, 1830–1860. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4614-3. The Later Victorians.** Continuation of ENGL 4604, covering 1860–1900. Prereq., junior standing. Restricted to English and humanities majors only.

## American Literature

**ENGL 3655-3. American Literature to 1860.** Chronological survey of the literature from Bradford to Whitman. Restricted to English, humanities, and film studies majors only. Prereq., sophomore standing. Credit not granted for this course and ENGL 3654.

**ENGL 3665-3. American Literature after 1860.** Chronological survey of the literature from Whitman to Faulkner. Continuation of ENGL 3655. Restricted to English, humanities, and film studies majors only. Prereq., sophomore standing. Credit not granted for this course and ENGL 3664.

**ENGL 4235-3. American Novel 1.** From the beginnings to 1900. Prereq., junior standing.

**ENGL 4245-3. American Novel 2.** From 1900 to the present. Prereq., junior standing.

**ENGL 4655-3. Studies in American Literature to 1900.** Extensive study of particular periods and movements in American literature. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4665-3. Studies in American Literature after 1900.** Extensive study of particular periods and movements in American literature. Prereq., junior standing. Restricted to English and humanities majors only.

## Advanced Theory, Genre Studies, and Popular Culture

**ENGL 2036-3. Introduction to Digital Media in the Humanities.** Serves as a humanities-based introduction to digital media structures such as digital archive and reading/writing software; studies theories and methodologies for undertaking digital media scholarship in the humanities; and explores digital textualities ranging from text messaging, blogging, and game to digital fiction and poetry.

**ENGL 3116-3. Topics in Advanced Theory.** Studies special topics in theory; specially designed for English majors. Topics vary each semester. May be repeated up to 6 total credit hours different topics. Prereq., sophomore standing.

**ENGL 3226-3. Folklore 1.** Emphasizes formal study of folk traditions (including tales, songs, games, customs, beliefs, and crafts) within a theoretical framework, using examples from several cultures. Prereq., sophomore standing.

**ENGL 3246-3. Topics in Popular Culture.** Studies special topics in popular culture; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics. Prereq., sophomore standing.

**ENGL 3796-3. Queer Theory.** Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, and gay literature. Examines relationships among aesthetic, cultural, and political agendas, and literary and visual texts of the 20th century. Prereq., sophomore standing. Same as LGBT 3796.

**ENGL 3856-3. Topics in Genre Studies.** Studies special topics in genre studies; specially designed for English majors. Topics vary each semester. May be repeated for a total of 6 credit hours for different topics. Prereq., sophomore standing.

**ENGL 4116-3. Advanced Topics in Media Studies.** Studies specialized topics in the history, theory, and practice of media, such as the history of the book the theory of digital media, and the theory and practice of multimedia forms. Specially designed for English majors. Topics vary from year to year. May be repeated up to 6 total credit hours. Restricted to sophomores/juniors/seniors.

**ENGL 4286-3. Folklore 2.** Upper-division studies of folk groups, events, texts, and contexts as they reflect traditional knowing—folk perceptions and teachings about the structure and purpose of the universe. Prereqs., ENGL 3226 and junior standing.

## Multicultural and Gender Studies

**ENGL 2707-3. Introduction to Lesbian, Bisexual, and Gay Literature.** Offers students at sophomore and junior levels an introduction to some of the forms, concerns, and genres of contemporary lesbian, bisexual, and gay writing in English. Prereq., sophomore standing. Same as LGBT 2707.

**ENGL 2717-3. Native American Literature.** Surveys traditional and contemporary North American Native American literature, from traditional oral forms to contemporary genre literature of novels, short stories, and poetry. Same as ETHN 2713.

**ENGL 2727-3. Survey of African American Literature 1.** Chronological study of African American literature from the 17th century to the Harlem Renaissance. Same as ETHN 2722.

**ENGL 2737-3. Survey of African American Literature 2.** Chronological study of African American literature from the Depression writers to the present. Same as ETHN 2732.

**ENGL 2747-3. Chicana/Chicano and Mexican Literature.** Introduces Chicana and Chicano and Mexican literary studies, focusing on narrative works by Chicana and Chicano writers. Examines diverse range of Mexican writing

in Greater Mexico as it addresses recurring issues and themes, including language, race and class, questions of identity and gender relations. Same as ETHN 2746.

**ENGL 2767-3. Survey of Post-Colonial Literature.** Surveys the development of literatures in English in former British colonies. Topics include the spread and adaptation of English language literary forms in Asia, Africa, the Caribbean, and the far new world (Australia and New Zealand). Students learn the causes of the dispersion and the motivations for the clearly different uses of English literary forms in the ex-colonies. Same as ETHN 2761.

**ENGL 3217-3. Topics in Gender Studies.** Studies special topics in gender studies; specially designed for English majors. Topics vary each semester. May be repeated up to 6 total credit hours for different topics. Prereq., sophomore standing.

**ENGL 3267-3. Women Writers.** Introduces literature by British and American women. Prereq., sophomore standing. Same as WMST 3267.

**ENGL 3377-3. Topics in Multicultural Literature.** Studies special topics in multicultural literature; specially designed for English majors. Topics vary each semester. May be repeated up to 6 total credit hours for different topics. Prereq., sophomore standing.

**ENGL 3677-3. Jewish-American Literature.** Explores the Jewish-American experience from the 19th century to the present through writers such as Sholem Aleichem, Peretz, Babel, Singer, Malamud, Miller, Ginsberg, and Ozick. The Jewish experience ranges from the travails of immigration to the loss of identity through assimilation. Restricted to sophomores/juniors/seniors. Same as JWST 3777. Approved for arts and sciences core curriculum: human diversity.

**ENGL 4277-3. Topics in Women's Literature.** Focuses on areas of research interest in the study of women's literature, such as selected themes or critical issues. Students are expected to contribute original research to the topic under consideration. Prereq., junior standing. Same as WMST 4277.

**ENGL 4287-3. Studies in Lesbian, Gay, Bisexual, and Transgender Literature.** Examines selected British, American, and French literary representations of lesbian and gay identity from the early 16th century to the present. Discusses the changing status of homosexuality as a literary and cultural topos, including how same-sex desire is defined, and the rhetorical and ideological difficulties involved in its representation. Specific topics vary each semester. May be repeated up to 9 total credit hours. Restricted to juniors and seniors. Same as LGBT/WMST 4287.

**ENGL 4697-3. Contemporary African American Literature 1.** Advanced in-depth study of the works of prominent African American novelists and poets. Restricted to juniors/seniors. Same as ETHN 4692.

## Critical Studies in English

**ENGL 4038-3. Critical Thinking in English Studies.** Concerned with developments in the study of literature that have significantly influenced our conception of the theoretical bases for study and expanded our understanding of appropriate subject matter. May not be repeated. Prereq., junior standing. Restricted to English and humanities majors only.

**ENGL 4728-3. Seminar: Topics in English.** Studies such topics as heroism in 18th-century literature, eros and violence, South African women writers, politics and religion in 16th century literature, and American humor. Topics vary with instructor. Prereq., junior standing.

## Graduate Courses

**ENGL 5019-3. Survey of Contemporary Literary Theory.** An introduction to the range and variety of critical and theoretical thought informing contemporary literary studies. Introduces methodologies such as new criticism, structuralism and poststructuralism, psychoanalysis, reader-response criticism, gender studies, Marxist criticism, multicultural and postcolonial theory, and postmodernism.

**ENGL 5029-3. Introduction to Literature of the British Isles: Pre-1660.** Introduces graduate level study of medieval and Renaissance literature. Studies conventional and technical vocabularies, genres, forms, and literary developments. Samples from the full range of the period will be studied, with atten-

tion to historical conventions and to research skills necessary for graduate study of the period. Topics vary each semester. Same as ENGL 5039 and 5049.

**ENGL 5039-3. Introduction to Literature of the British Isles: Pre-1660.** Same as ENGL 5029 and 5049.

**ENGL 5049-3. Introduction to Literature of the British Isles: Pre-1660.** Same as ENGL 5029 and 5039.

**ENGL 5059-3. Introduction to Literature of the British Isles: 1660–1900.** Introduces graduate level study of Restoration, 18th century, Romantic, and Victorian literature. Studies conventional and technical vocabularies, genres, forms, and literary developments. Samples from the full range of the period will be studied, with attention to historical conventions and to research skills for graduate study of the period. Topics vary each semester. Same as ENGL 5069 and 5079.

**ENGL 5069-3. Introduction to Literature of the British Isles: 1660–1900.** Same as ENGL 5059 and 5079.

**ENGL 5059-3. Introduction to Literature of the British Isles: 1660–1900.** Same as ENGL 5059 and 5069.

**ENGL 5109-3. Introduction to Literature of the United States.** Introduces graduate level study of American literature. Studies conventional and technical vocabularies, genres, forms, and literary developments. Samples from the full range of the period will be studied, with attention to historical conventions and to research skills necessary for graduate study of the period. Topics vary each semester. Same as ENGL 5119 and 5129.

**ENGL 5119-3. Introduction to Literature of the United States.** Same as ENGL 5109 and 5129.

**ENGL 5129-3. Introduction to Literature of the United States.** Same as ENGL 5109 and 5119.

**ENGL 5139-3. Introduction to 20th Century Literature in English.** Introduces graduate level study of modern and contemporary literature in English from around the world. Studies conventional and technical vocabularies, genres, forms, and literary developments. Samples from the full range of the period will be studied, with attention to historical conventions and to research skills necessary for graduate study of the period. Topics vary each semester. Same as ENGL 5149 and 5159.

**ENGL 5149-3. Introduction to 20th Century Literature in English.** Same as ENGL 5139 and 5159.

**ENGL 5159-3. Introduction to 20th Century Literature in English.** Same as ENGL 5139 and 5149.

**ENGL 5169-3. Introduction to Multicultural Literature.** Introduces graduate level study of multiculturalism in the Anglophone tradition, including ethnic American and postcolonial literatures in English. Includes attention to theories of ethnicity and minority discourse. Studies conventional and technical vocabularies, genres, forms, and literary developments. Samples from the full range of the period will be studied, with attention to historical conventions and to research skills necessary for graduate study of the period. Topics vary each semester. Same as ENGL 5179 and 5189.

**ENGL 5179-3. Introduction to Multicultural Literature.** Same as ENGL 5169 and 5189.

**ENGL 5189-3. Introduction to Multicultural Literature.** Same as ENGL 5169 and 5179.

**ENGL 5229-3. Poetry Workshop.** Designed to give students time and impetus to generate poetry and discussion of it in an atmosphere at once supportive and critically serious. Admission to grad creative writing students or by instructor's approval of an application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5239-3. Fiction Workshop.** Designed to give students time and impetus to generate fiction and discussion of it in an atmosphere at once supportive and critically serious. Admission to grad creative writing students or by instructor's approval of an application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5259-3. Nonfiction Workshop.** Designed to give students time and impetus to generate nonfiction and discussion of it in an atmosphere at once

supportive and critically serious. Admission to grad creative writing students or by instructor's approval of an application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5269-3. Publishing Workshop.** Provides practical experience in the editorial, design, and business procedures of desktop publishing. May be repeated up to 6 total credit hours.

**ENGL 5279-3. Studies in Poetry.** Addresses modern poetry, written since World War II. May be repeated up to 6 total credit hours.

**ENGL 5289-3. Scriptwriting Workshop.** Designed to give time and impetus to scriptwriting in terms of both imaginative and technical aspects. Either stage plays or screenplays are studied, as announced. Admission to graduate creative writing program students and by application manuscript. May be repeated up to 9 total credit hours.

**ENGL 5299-3. Studies in Fiction.** Addresses modern fiction written since World War II. May be repeated up to 6 total credit hours.

**ENGL 5309-3. Playwriting.**

**ENGL 5319-3. Studies in Literary Movements.** Studies styles, trends, innovations, and major writers in significant literary movements, particularly those after 1900, such as modernism and objectivism. May be repeated up to 9 total credit hours. Restricted to graduate CRWR, ENLT, and ENGL majors.

**ENGL 5529-3. Studies in Special Topics.** Studies special topics that focus on a theme, genre, or theoretical issue not limited to a specific period or national tradition. Topics vary each semester. May be repeated up to 9 total credit hours. Same as ENGL 5549 and 5559.

**ENGL 5549-3. Studies in Special Topics.** Same as ENGL 5529 and 5559.

**ENGL 5559-3. Studies in Special Topics.** Same as ENGL 5529 and 5549.

**ENGL 5849 (1-6). Independent Study (Graduate Level 1).** Independent investigation of topics of specific interest to individual students. Students wishing to enroll in independent study must petition the Associate Chair for Graduate Studies prior to the beginning of the semester. May be repeated up to 6 total credit hours.

**ENGL 6949 (1-3). Master's Degree Candidate.**

**ENGL 6959 (1-9). Master's Thesis.**

**ENGL 7019-3. Advanced Literature of the British Isles: Pre-1660.** Studies special topics in medieval and/or Renaissance literature. Topics vary each semester. May be repeated up to 9 total credit hours. Recommended prereqs., ENGL 5019, 5029 or 5039. Same as ENGL 7029 and 7039.

**ENGL 7029-3. Advanced Literature of the British Isles: Pre-1660.** Same as ENGL 7019 and 7039.

**ENGL 7039-3. Advanced Literature of the British Isles: Pre-1660.** Same as ENGL 7019 and 7029.

**ENGL 7059-3. Advanced Literature of the British Isles: 1660–1900.** Studies special topics in Restoration, 18th century, Romantic, and/or Victorian literature. Topics vary each semester. May be repeated up to 9 total credit hours. Recommended prereqs., ENGL 5059, 5069, or 5079. Same as ENGL 7069 and 7079.

**ENGL 7069-3. Advanced Literature of the British Isles: 1660–1900.** Same as ENGL 7059 and 7079.

**ENGL 7079-3. Advanced Literature of the British Isles: 1660–1900.** Same as ENGL 7059 and 7069.

**ENGL 7119-3. Advanced Literature of the United States.** Studies special topics in American literature. Topics vary each semester. May be repeated up to 9 total credit hours. Recommended prereqs., ENGL 5109, 5119, or 5129. Same as ENGL 7129 and 7139.

**ENGL 7129-3. Advanced Literature of the United States.** Same as ENGL 7119 and 7139.

**ENGL 7139-3. Advanced Literature of the United States.** Same as ENGL 7119 and 7129.

**ENGL 7149-3. Advanced 20th Century Literature in English.** Studies special topics in modern and contemporary literature in English from around the world. Topics vary each semester. May be repeated up to 9 total credit hours.

Recommended prereqs., ENGL 5139, 5149, or 5159. Same as ENGL 7159 and 7169.

**ENGL 7159-3. Advanced 20th Century Literature in English.** Same as ENGL 7149 and 7169.

**ENGL 7169-3. Advanced 20th Century Literature in English.** Same as ENGL 7149 and 7159.

**ENGL 7179-3. Advanced Multicultural Literature.** Studies special topics in multiculturalism in the Anglophone tradition, including ethnic American and postcolonial literatures in English and theories of ethnicity and minority discourse. Topics vary each semester. May be repeated up to 9 total credit hours. Recommended prereqs., ENGL 5169, 5179, or 5189. Same as ENGL 7189 and 7199.

**ENGL 7189-3. Advanced Multicultural Literature.** Same as ENGL 7179 and 7199.

**ENGL 7199-3. Advanced Multicultural Literature.** Same as ENGL 7179 and 7189.

**ENGL 7489-3. Advanced Literary Theory.**

**ENGL 7849 (1-3). Independent Study (Graduate Level 2).** May be repeated up to 7 total credit hours.

**ENGL 7859-1. Introduction to PhD Research and Professional Development.** Skills course designed to equip midlevel or advanced graduate students with rudiments of practical research skills and techniques (bibliography, history of the book, codicology, manuscripts, databases, World Wide Web, and Internet) and orientation to possible future in the profession. Recommended prereq., critical analysis and literary theory.

**ENGL 8999 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Environmental Studies

**ENVS 1000-4. Introduction to Environmental Studies.** Surveys environmental studies, examining ecological, socioeconomic, political, aesthetic, and technological factors that influence the quality of life on Earth. Required for ENVS majors. Approved for arts and sciences core curriculum: natural science.

**ENVS 2840 (1-6). Independent Study.** Students work with an approved faculty sponsor to explore a topic in greater depth and to pursue an interest that is not offered in the formal curriculum. May be repeated up to 8 total credit hours. Prereq., ENVS 1000.

**ENVS 3001-3. Sustainable Solutions Consulting.** Introduces students to green design, industrial ecology, and life cycle analysis. Students use basic techniques of environmental auditing to analyze the CU-Boulder campus. Prereq., any two-semester science sequence. Restricted to junior and senior ENVS majors.

**ENVS 3003-3. Race, Class, and Pollution Politics.** Examines communities affected by major toxic contamination threats in the U.S., evaluating race and class factors in levels of governmental and private sector responses and actions. Examines investigative research methods at case study sites to provide skills necessary for assessment of any environmental threat for protective action. Restricted to junior/senior ENVS majors.

**ENVS 3020-3. Advanced Writing in Environmental Studies.** Offers training in critical thinking and analytical writing skills appropriate to upper-division classes. Writing assignments integrate the subject matter of different topical areas. Restricted to junior and senior ENVS majors. Approved for arts and sciences core curriculum: written communication.

**ENVS 3040-4. Conservation Biology.** Applies principles of population ecology, population genetics, biogeography, animal behavior, and paleobiology to the maintenance of biodiversity and natural systems. The resulting theory is then applied to conservation policy and management techniques. Prereq., EBIO 2040 or 2640. Same as EBIO 3040.

**ENVS 3070-3. Energy and the Environment.** Examines contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and

alternative transportation vehicles. Includes some basic physical concepts and principles that often constrain choices. No background in physics is required. Same as PHYS 3070. Approved for arts and sciences core curriculum: natural science.

**ENVS 3140-3. Environmental Ethics.** Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical approaches to the environment. Prereq., sophomore standing or PHIL 1100, 1200, 2200, 3100, or 3200. Same as PHIL 3140. Approved for arts and sciences core curriculum: ideals and values.

**ENVS 3434-3. Introduction to Applied Ecology.** Emphasizes the integration of physical, chemical, and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project. Prereq., CHEM 1111 or CHEN 1211 and 1221. Same as CVEN 3434.

**ENVS 3520-3. Environmental Issues in Geosciences.** Addresses current environmental problems that need an understanding of geology. Topics include energy resources, climate modification, hydrology, waste disposal, and mining resources. Uses specific examples to illustrate restrictions imposed by nature and man on solutions to these problems. Prereq., a two-course sequence in any natural science. Same as GEOL 3520. Approved for arts and sciences core curriculum: natural science.

**ENVS 3600-3. Principles of Climate.** Describes the basic components of the climate system: the atmosphere, ocean, cryosphere, and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system, including the hydrological cycle and its role in climate, climate stability, and global change. Covers forecasting climate, its applications, and human dimensions. Prereqs., ATOC 1050 and 1060, or ATOC 3300/GEOG 3301, or GEOG 1001 and 1-semester calculus. Same as GEOG 3601 and ATOC 3600. Approved for arts and sciences core curriculum: natural science.

**ENVS 3621-3. Energy Policy and Society.** Examines how society makes decisions about energy, and how these decisions affect the environment and the economy. Uses tools from policy analysis, economics, and other disciplines to build an in-depth understanding of energy's role in U.S. contemporary society. Recommended prereqs., ENVS/PHYS 3070.

**ENVS 3800-3. The Art of Research: The Essential Elements of Research in Environmental Studies.** Introduces students to the practice of doing research in environmental studies. Examines how to define a research problem, select methods, design research, construct arguments and evaluate others' research. Aims to familiarize students with the process of doing research and enable them to proceed with confidence in pursuing their own research topics. Recommended for juniors planning to write ENVS honors theses. Prereq., ENVS 1000. Recommended prereq., ENVS 3020. Restricted to juniors/seniors.

**ENVS 3930 (1-3). Internship.** Relates classroom theory to practice. Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to students' career goals. May be repeated up to 6 total credit hours.

**ENVS 4027-3. Inequality, Democracy, and the Environment.** Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between (a) inequality and democratic decision making and (b) undemocratic decision making; U.S. and corporate food and energy policy; and global environmental degradation. The course also focuses on the role that global inequality plays in fostering environmental degradation. Restricted to juniors/seniors. Same as SOCY 4027.

**ENVS 4050-3. Field Studies in Environmental Sciences.** Includes field-oriented courses offered at irregular intervals during academic year or during summer sessions.

**ENVS 4100 (1-3). Topics in Environmental Policy.** Covers a variety of topics not currently offered in the curriculum; offered depending on instructor availability and student demand. May be repeated up to 9 total credit hours, provided the topics vary.

**ENVS 4120 (1-3). Topics in Environmental Sciences.** Covers a variety of topics not currently offered in the curriculum; offered depending on instructor

availability and student demand. May be repeated up to 6 total credit hours, provided the topics vary. Restricted to junior and senior ENVS majors.

**ENVS 4160-3. Introduction to Biogeochemistry.** Covers fundamentals of biogeochemical cycling, emphasizing water, carbon, and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere, and hydrosphere, and natural and human-managed environments. Prereqs., GEOL 3320 or EBIO 3270, and CHEM 1011 or higher. Same as GEOL and EBIO 4160

**ENVS 4201-3. Biometeorology.** Introduces this interdisciplinary science, studying the interactions between atmospheric processes and living organisms (plants, animals, and humans). Discusses how organisms adapt to a changing environment. Uses a practical, problem-solving approach to explore these interactions. Prereq., GEOG 1001. Same as GEOG 4201.

**ENVS 4630 (2-6). Field Techniques in Environmental Science.** Field and laboratory methods for assessing the abiotic and biotic environment. Emphasizes field techniques in climatology, surveying soils, hydrology, geomorphology, plant and animal ecology, and environmental law. Evaluation by written module reports and maps. This course may use animals and/or animal tissues. Prereqs., EBIO 2040 and instructor consent. Same as EBIO 4630.

**ENVS 4795-3. Museum Field Methods/Zoology and Botany.** Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates, and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods, and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts, and individual research projects. Same as MUSM 4795 and EBIO 4795.

**ENVS 4800-3. Critical Thinking in Environmental Studies.** Examines a specific environmental topic in depth, synthesizing information from complex and controversial issues. Different course sections present different topics. May be repeated up to 6 total credit hours. Restricted to students with junior or senior status in environmental studies.

**ENVS 4840 (1-6). Independent Study.** May be repeated up to 8 total credit hours. Prereq., ENVS 1000.

**ENVS 4990-3. Senior Thesis.** Supervised project involving original research. Open only to environmental studies majors with at least a 3.30 GPA. Thesis proposal must be accepted by honors chairman. May be repeated up to 6 total credit hours.

**ENVS 5000-3. Policy, Science, and the Environment.** Introduction to methodologies of the policy sciences with emphasis on applications to environmental issues; role of science in decision making; professional roles and responsibilities as a policy analyst.

**ENVS 5001-3. Environmental Philosophy.** A survey of the major philosophical issues in environmental studies, comprising key issues in environmental ethics, in environmental political philosophy, and in the philosophy of biology and ecology.

**ENVS 5002-3. Environmental Science.** Surveys methodologies of environmental science. Emphasizes understanding the scientific basis of current environmental problems, and linking scientific understanding to policy making.

**ENVS 5100 (1-3). Special Topics in Environmental Studies.** A variety of topics not currently offered in curriculum; offered depending on instructor availability and student demand. May be repeated up to 9 total credit hours, provided the topics vary.

**ENVS 5110 (1-3). Topics in Environmental Social Science and Humanities.** Covers various topics in the social sciences and humanities in environmental studies.

**ENVS 5120 (1-3). Topics in Quantitative Methods.** Covers a wide range of quantitative methods used in policy research and their applications. Topics may include decision-making under uncertainty, fundamentals of microeconomics, mathematics of economic efficiency, cost-benefit analysis, system optimization, budgeting, fundamentals or probability, risk assessment, risk perception, risk communication, and decision analysis. Includes practical exercises, as well as readings and discussion, of various strengths and weaknesses of the different methods.

**ENVS 5710-3. Introduction to the Policy Sciences.** Provides an introduction to the policy sciences as a distinctive tradition within the policy field. Emphasizes the use of conceptual tools to improve analysis of complex problems. Teaches problem-solving framework that students apply to an issue of their choice. Restricted to graduate students or instructor consent required. Same as PSCI 7016.

**ENVS 5720-3. The Problem Orientation.** Teaches basic problem-solving framework for policy analysis. Emphasizes applications to develop policy recommendations for issues selected by students. Includes group projects. Restricted to graduate students or instructor consent required. Same as PSCI 7026.

**ENVS 5730-3. Introduction to the Policy Sciences: the Decision Process.** Provides policy sciences frameworks for analyzing policy processes and designing political strategies to influence those processes in the direction of the preferred alternative. Emphasizes applications to problems selected by students for term projects. Restricted to graduate students or instructor consent required. Same as PSCI 7036.

**ENVS 5740-3. Context-Sensitive Research Methods.** Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies, and textual analyses. Restricted to graduate students or instructor consent required. Same as PSCI 7116.

**ENVS 5810-3. Water Resources and Environmental Sustainability.** Assesses impacts of climate variability and regional growth on western U.S. water resources, and examines successes and failures of different management strategies, as well as ways that science is used and misused in support of water management.

**ENVS 5820-3. Renewable Energy Policy.** Examines the technology, policy and politics of renewables. Technology includes the resource, science, and engineering aspects of renewables. Policy includes various policy levers used to influence renewables. Politics refers to political settings of renewables: how decision-makers perceive them, who supports/ opposes policies, and how policies progress through the political process. Prereq., an introductory energy science and technology course.

**ENVS 5830-3. Critical Issues in Climate and the Environment.** Discusses current issues such as ozone depletion, global warming, and air quality for graduate students in nonscientific fields. Provides the scientific background necessary to understand, follow scientific developments, and critically evaluate these issues. Same as ATOC 5000. Credit not granted for this course and ATOC 4800.

**ENVS 5840-3. Global Biogeochemical Cycles.** Focuses on the cycling of elements at the global scale with a particular emphasis on human modification of biogeochemical cycles. Major biogeochemical cycles, their past dynamics, present changes, and potential future scenarios will be addressed. Ecosystem to global-scale model of the earth system will be discussed, along with global-scale measurements of element fluxes from satellites, aircraft, and measurement networks. Prereq., general chemistry, some organic chemistry. Same as GEOL 5305.

**ENVS 5909 (1-3). Independent Study.** Only 3 hours of independent study can be used towards degree requirements. May be repeated up to 6 total credit hours for different topics. Prereq., department and instructor consent.

**ENVS 5930-2. Internship.** Provides academically supervised opportunities for environmental studies majors to work in public and private organizations on projects related to the students' research and career goals, and to relate classroom theory to practice.

**ENVS 6007-3. Foundations of Environmental Sociology.** Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters. Same as SOCY 6007.

**ENVS 6112-3. Foundations of American Natural Resources Law.** Introduces students to the law of natural resources. Examines the legal, historical, political, and intellectual influences that shape resources development and conservation. Same as LAWS 6112.

**ENVS 6940-3. Master's Degree Candidacy.**

**ENVS 6950 (1-6). Master's Thesis.**

**ENVS 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Ethnic Studies

### Crosscultural/Comparative Studies

**ETHN 2001-3. Foundations: Race and Ethnicity in the United States.** Introduction to race and ethnicity in the United States. This course will focus on the five major racialized groups (African Americans, Asian Americans, Chicanos and Chicanos, European Americans and Indigenous peoples) in the U.S.

The course design centers on historical and contemporary ideologies and systems that have constructed and continue to define, shape and impact the significance of race and ethnicity in our economic, political and social lives. Formerly ETHN 2000.

**ETHN 2761-3. Survey of Post-Colonial Literature.** Surveys the development of literatures in English in former British colonies. Topics include the spread and adaptation of English language literary forms in Asia, Africa, the Caribbean, and the far new world (Australia and New Zealand). Students learn the causes of the dispersion and the motivations for the clearly different uses of English literary forms in the ex-colonies. Same as ENGL 2767. Formerly ETHN 2762.

**ETHN 3031-3. Racist Ideologies.** Explores the origins and evolution of racism as a political and religious force in American life, beginning with Puritan ideology in colonial New England, proceeding through the era of Manifest Destiny, and ending in the present day. Special attention is paid to the history of organizations such as the Ku Klux Klan, and emergence of Christian identity doctrine. Prereq., ETHN 2001 or equivalent. Formerly ETHN 3013.

**ETHN 3101-3. Selected Topics in Ethnic Studies.** Intensive examination of a particular topic, theme, issue, or problem in ethnic studies as chosen by the instructor. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 2001 or equivalent. Formerly ETHN 3100.

**ETHN 3201 (3-4). Multicultural Leadership: Theories, Principles and Practices.** Focuses on leadership theories and skills necessary for effectiveness in multicultural settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change through comparative analyses of western and non-western theories and practices. Community service required. Prereq., ETHN 2001 or equivalent. Formerly ETHN 3200 Same as INVS 3100 and LDSP 3100. Approved for arts and sciences core curriculum: human diversity.

**ETHN 3301-3. Elements of Religion.** Explores universal components of religion, as inferred from religions of the world, ranging from smaller-scale oral to larger-scale literate traditions. Same as ANTH 3300. Formerly ETHN 3300.

**ETHN 3501-3. Research Methods in Ethnic Studies.** Preparation for empirical inquiry in Ethnic Studies. Emphasizes philosophy of social science and cultural studies. Students engage rigorous theoretical concepts to understand quantitative and qualitative research methods. Prepares students for writing a lengthy research paper in ETHN 4511. Prereq., ETHN 2001. Restricted to sophomore/junior/senior ETHN majors. Formerly ETHN 3500.

**ETHN 3671-3. People of Color and Social Movements.** People of color the world over are struggling for sovereignty, independence, civil and human rights, food security, decent wages and working conditions, healthy housing, and freedom from environmental racism and other forms of imperialism. Course analyzes and brings alive these struggles. Prereq., ETHN 2001 or equivalent. Restricted to junior/seniors. Approved for arts and sciences core curriculum: human diversity. Formerly ETHN 3675.

**ETHN 3841 (1-6). Undergraduate Independent Study.** Consult the Department of Ethnic Studies for information. May be repeated up to 6 total credit hours. Prereq., ETHN 2001 and department and instructor consent. Formerly ETHN 3840.

**ETHN 4001-3. Screening Race, Class, and Gender in the U.S. and the Global Borderlands.** Engaging with the ways in which racial, class, gender and

sexual oppression intersect, this class examines several filmic productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropolises of the global borderlands. Prereq., ETHN 2001 or equivalent ETHN course. Same as FILM 4001. Formerly ETHN 3001.

**ETHN 4511-3. Research Practicum in Ethnic Studies.** Students conduct research in the library or in the field and write a lengthy paper on a topic, issue or theme pertinent to Ethnic Studies. The foundation for this course is ETHN 3501. Prereqs., ETHN 2001 and 3501. Restricted to junior/senior ETHN majors. Formerly ETHN 4510.

**ETHN 4521-3. Applied Cultural Anthropology.** Analyzes problems of cultural change due to contacts between people of different cultures. Restricted to senior ANTH or ETHN majors. Same as ANTH 4510. Formerly ETHN 4520.

**ETHN 4841 (3-6). Independent Study.** Work with an approved faculty sponsor to explore a topic in greater depth. May be repeated up to 6 total credit hours for different topics. Prereq., department and instructor consent.

**ETHN 4951-3. Senior/Graduate Seminar in Ethnic Studies.** Capstone experience in Ethnic Studies. Includes an independent research project and public presentation. Prereqs., ETHN 2001, 3501 and 4511. Restricted to junior/seniors/graduates. Same as ETHN 5951.

**ETHN 4961-3. Honors Thesis I.** Supervised project involving original research in the emerging field of ethnic studies. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended. Prereqs., honors standing in the Department of Ethnic Studies, ETHN 2001 and ETHN 4511. Restricted to senior ETHN majors. Formerly ETHN 4960.

**ETHN 4971-3. Honors Thesis II.** Prereqs., honors standing in the Department of Ethnic Studies, ETHN 2001, 4511 and 4961. Restricted to senior ETHN majors. Formerly ETHN 4970.

**ETHN 5951-3. Senior/Graduate Seminar in Ethnic Studies.** Same as ETHN 4951.

### Africana Studies

**ETHN 2002-3. Introduction to Africana Studies.** Overview of Africana studies as a field of investigation, its origins, and history. Formerly BLST 2000. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**ETHN 2232-3. Contemporary African American Social Movements.** Examines selected case studies of African American collective behavior in a historical context. Emphasizes an in-depth investigation of the continuing African American struggle for social/democratic rights. Formerly BLST 2200. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**ETHN 2242-3. African American Social and Political Thought.** Introductory course designed to acquaint students with historical and contemporary thinking, writings, and speeches of African Americans. Formerly BLST 2210. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**ETHN 2432-3. African American History.** Surveys African American history. Studies, interprets and analyzes major problems, issues, and trends affecting African Americans from about 1600 to the present. Same as HIST 2437. Formerly BLST 2437. Approved for arts and sciences core curriculum: human diversity or contemporary societies or United States context.

**ETHN 2502-2. African Dance.** Explores the technique, style, and rhythms of various African, Caribbean, and dance forms of the Americas. Music, history, anthropology, and folklore help to enhance the dance and provide a cultural experience. May be repeated up to 6 total credit hours within a term. Same as DNCE 2501. Formerly BLST 2501.

**ETHN 2722-3. Survey of African American Literature 1.** Chronological study of African American literature from the 17th century to the Harlem Renaissance. Same as ENGL 2727. Formerly BLST 2722.

**ETHN 2732-3. Survey of African American Literature 2.** Chronological study of African American literature from the Depression writers to the present. Same as ENGL 2737. Formerly BLST 2732.



**ETHN 3012-3. Black Politics.** Discusses elitism and black powerlessness; black interest groups; base, structure, and functions of black political organizations; goals and political styles of black politicians; community control; trends (radicalism and separatism vs. accommodation); and future of black politics in the United States. Prereq., ETHN 2001 or 2002. Same as PSCI 3101. Formerly BLST 3101. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**ETHN 3022-3. Selected Topics in African American Studies.** Intensive examination of a particular topic, theme, issue, or problem concerning the African American presence, as chosen by the instructor. Sample offerings could include African American pop culture the Civil Rights Movement, or other African American issues. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 2001, 2002 or equivalent. Formerly BLST 3020.

**ETHN 3112-3. African American Educational History.** Examines the history of the education of African Americans from early American history until current times. Covers primary, secondary, and higher education. Topics include education of African Americans before 1800, education of African Americans during the period of American slavery, and factors affecting today's education gains. Also covers current research being conducted in higher education. Prereq., ETHN 2001, 2002 or equivalent. Formerly BLST 3103.

**ETHN 3502-3. Historical and Contemporary Issues of African American Women.** Explores the social, economic, political, historical, and cultural role of African American women from an interdisciplinary perspective. Special emphasis is placed on African American women's rich oral and literary tradition. Prereq., ETHN 2001, 2002, WMST 2000 or equivalent. Same as WMST 3505. Formerly BLST 3505.

**ETHN 4232-3. The Life and Thought of Martin Luther King Jr.** An intensive exploration and examination of the life and thought of the Rev. Dr. Martin Luther King Jr. Special emphasis on the stages of his life and their corresponding productions. Prereq., ETHN 2001 or 2002 or equivalent. Restricted to juniors/seniors. Formerly BLST 4235.

**ETHN 4252-3. African American Urban History.** Fosters a better understanding and appreciation of the role African Americans have played in the evolution and shaping of urban America. Employs techniques of urban studies to more effectively assess the many dimensions, subtleties, and insensitivities of life in the city. Prereq., ETHN 2001, 2002 or equivalent. Recommended prereq., a working knowledge of U.S. and African American history. Restricted to juniors/seniors. Formerly BLST 4250.

**ETHN 4652-3. Contemporary Issues in African American Studies.** Variable topic that allows intensive coverage of a subject, theme, or issue in African American studies. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 2001, 2002 or equivalent. Restricted to juniors/seniors. Formerly BLST 4650.

**ETHN 4672-3. Seminar on the Civil Rights and Black Power Movements.** A review of the ideas, events, persons, organizations oriented to the quest for African American social justice in the decade of the Sixties. Prereq., ETHN 2001 or 2002. Restricted to juniors/seniors or instructor consent. Formerly BLST 4670.

**ETHN 4692-3. Contemporary African American Literature 1.** Advanced in-depth study of the works of prominent African American novelists and poets. Prereq., ETHN 2001 or 2002. Restricted to juniors/seniors. Same as ENGL 4697. Formerly BLST 4692.

## American Indian Studies

**ETHN 1123-3. Exploring Non-Western Cultures: Hopi and Navajo.** Explores two American Indian cultures, Hopi and Navajo, and cultural interrelationships from the prehistory through the contemporary period, using an integrated, holistic, and humanistic viewpoint. Same as ANTH 1120. Formerly AIST 1125. Approved for arts and sciences core curriculum: human diversity.

**ETHN 2003-2. Introduction to American Indian Studies.** Introduces students to key issues in the field including past and enduring structures of Native governance, justice systems, ways of understanding the world, scholarship, and artistic and literary expressions. Course materials are used to critically examine how academics, activists, authors, artists, poets, and filmmakers use their work to make political statements, address/redress historical subjects,

and represent their Native communities. Formerly AIST 2000. Approved for arts and sciences core curriculum: human diversity.

**ETHN 2013-3. Critical Issues in Native North America.** Explores a series of issues including regulations of populations, land and resource holdings, water rights, education, religious freedom, military obligations, the sociopolitical role of men and women, self-governance, and legal standing as these pertain to American Indian life. Formerly AIST 2015. Approved for arts and sciences core curriculum: human diversity or United States context.

**ETHN 2203-3. American Indians in Film.** Examines images of American Indians in films produced by, and about, Native peoples. Follows the creation of "the Hollywood Indian" from still-photography to contemporary motion pictures. Films are analyzed within historical, social, and artistic contexts, and examined in terms of the impact their images have exerted upon American society at large and Native communities in particular. Formerly AIST 2201.

**ETHN 2703-3. American Indian Religious Traditions.** Introduces religions of the peoples indigenous to the Americas. Concerns include ritual, mythology, and symbolism occurring throughout these cultures in such areas as art, architecture, cosmology, shamanism, sustenance modes, trade, and history. Same as RLST 2700. Formerly AIST 2700. Approved for arts and sciences core curriculum: human diversity or ideals and values.

**ETHN 2713-3. Native American Literature.** Surveys historical and contemporary North American Native American literature. Examines the continuity and incorporation of traditional stories and values in Native literature, including novels, short stories, and poetry. Same as ENGL 2717. Formerly AIST 2712.

**ETHN 3023-3. Selected Topics in American Indian Studies.** Examines a particular topic, theme, issue, or problem in American Indian Studies. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 2001 or 2003 or equivalent. Formerly AIST 3020.

**ETHN 3133-3. North American Indians: Traditional Cultures.** Comprehensive survey of native cultures of America north of Mexico, including a review of their natural environments, prehistory, languages, and major institutions for the various culture areas. Prereq., ETHN 2001 or 2003. Same as ANTH 3130. Formerly AIST 3135.

**ETHN 3213-3. American Indian Women.** Explores the experiences, perspectives, and status of American Indian women in historical and contemporary contexts. Examines representations of indigenous women in mainstream culture. Emphasizes the agency of American Indian women-their persistence, creativity, and activism, especially in maintaining indigenous traditions. Prereq., WMST 2000, 2600, or ETHN 2001 or 2003. Restricted to sophomores/juniors/seniors. Same as WMST 3210. Approved for arts and sciences core curriculum: human diversity. Formerly AIST 3210.

**ETHN 3403-3. Indian/Government Conflicts.** Deals with historical events involving conflicts between the U.S. government and American Indians. Examples include the role of the FBI in the Pine Ridge Sioux Reservation (1972-76) or the 1864 massacre of the Cheyenne and Arapaho Indians in Colorado territory. Additional courses may relate to tribal governments. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 2001, 2003, 2013. Restricted to juniors/seniors. Formerly AIST 3400.

**ETHN 4563-3. North American Indian Acculturation.** Comprehensive survey of changes in the native cultures of America north of Mexico caused by occupation of the continent of Old World populations, including a review of processes of contact, environmental changes, changes in major institutions, the nature of federal/state administration, the reservation system, and contemporary developments. Prereq., ETHN 2001 or 2003. Restricted to junior/senior ANTH or ETHN majors. Same as ANTH 4560. Formerly AIST 4565. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

## American Studies

**ETHN 2004-3. Themes in American Culture 1.** Enables students to explore various themes in pre-1865 American culture. Examines these themes, which vary each year, in their social context. Formerly AMST 2000. Approved for arts and sciences core curriculum: United States context.

**ETHN 2014-3. Themes in American Culture 2.** Enables students to explore various themes in post-1865 American culture. Examines these themes, which

vary each year, in their social context. Formerly AMST 2010. Approved for arts and sciences core curriculum: United States context.

**ETHN 2064-3. Topics in American Studies.** Critically examines American identity and experiences, past and present, focusing on ethnicity, gender, popular culture, and political culture. Formerly AMST 2060.

**ETHN 3954-3. Methods in American Ethnic Studies.** Through structured discussions, selected readings, and written assignments, students develop an understanding of theoretical concepts that engage race, class, gender, and sexuality in American ethnic studies. Emphasizes critical analysis and theoretical arguments that encourage students to become critical thinkers. Prereqs., ETHN 2001 or 2004 and ETHN 2014 or 2064. Restricted to juniors and seniors. Formerly AMST 3950.

**ETHN 4324-3. Media Institutions and Economics.** Introduces the institutions and practices of the media industries. Surveys the histories, structures, and activities of these organizations and the contemporary issues surrounding them. Prereq., ETHN 2001, 2004, or 2064. Restricted to juniors/seniors. Same as JOUR 4321. Formerly AMST 4321.

**ETHN 4344-3. 20th Century American Intellectual History.** Addresses the impacts of political, social, and economic developments on ideas about democracy, science, race, gender, faith, the supposed mission of America, and the role of intellectuals in society. Prereq., ETHN 2001, 2004, or 2064. Restricted to juniors/seniors. Same as HIST 4346. Formerly AMST 4346.

**ETHN 4504-3. Ethnic-American Autobiography.** Investigates the genre of autobiography in America from its inception to the present. American autobiography has been associated with the invention of national character and, thus, is a site of cultural contestation and identity formation. Its changing form crosses disciplinary lines and provides a site for discourses on ethnicity, class, gender, sexuality, age, family, religion, and other American cultural conflicts. Prereq., ETHN 2001, 2004, or 2064. Restricted to juniors/seniors. Formerly AMST 4500. Approved for arts and sciences core curriculum: United States context.

## Asian American Studies

**ETHN 1025-3. Introduction to Asian American Studies.** Examines the various factors that define minority groups and their positions in American society using Asian Americans as a case study. Emphasizes the perspectives and methodologies of the discipline of ethnic studies. Formerly AAST 1015. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**ETHN 2215-3. The Japanese American Experience.** Surveys the Japanese American experience, emphasizing post-WWII developments. Gives attention to intragroup diversity having to do with generation, ethnicity, ecology, and gender. Recommended prereq., ETHN 1025. Formerly AAST 2210. Approved for arts and sciences core curriculum: human diversity.

**ETHN 3015-3. Asian Pacific American Communities.** Covers the concepts, methods, and theories commonly used in community research, as well as substantive information on selected Asian/Pacific American communities. Emphasizes the ethical/political dimensions of community studies. Prereq., ETHN 2001 or 1025. Formerly AAST 3013. Approved for arts and sciences core curriculum: United States context or contemporary societies.

**ETHN 3425-3. Selected Topics in Asian American Studies.** Intensive examination of a topic or issue affecting Asian Americans, such as the Japanese American internment during World War II, or Asian American social movements or community organizations. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 1025 or 2001. Formerly AAST 3420.

**ETHN 3575-3. Japanese American Internment: Critical Thinking in Socio-cultural Diversity.** Offers an historical overview of the Japanese American experience in the United States. Introduces and explores fundamental issues inherent in the study of human beings from the perspective of cultural social difference. Prereq., ETHN 1025 or 2001. Restricted to juniors/seniors. Formerly AAST 3670.

**ETHN 3905-3. Asian American Women: Historical and Contemporary Issues.** Drawing from work produced by and about Asian American women, examines historical and contemporary issues including representation of Asian American women, identity politics, feminism, coalition building, and activism for

social change. Prereq., WMST 2000 or 2600 or ETHN 1025, 2001, or 2004. Restricted to sophomores/juniors/seniors. Same as WMST 3900. Formerly AAST 3900. Approved for arts and sciences core curriculum: United States context.

## Chicana/o Studies

**ETHN 1036-3. Chicana and Chicano Humanities.** Provides foundation for study of Chicana/o literature, music, arts, theatre, and film. Also introduces aesthetic and critical concepts and their applications in Chicana and Chicano studies. Formerly CHST 1031. Approved for arts and sciences core curriculum: human diversity.

**ETHN 2536-3. Survey of Chicana and Chicano History and Culture.** Through historical and social scientific studies, novels, autobiographies, testimonies, films, music and art, this course will provide students a survey of Chicana/o history and culture. Historical overviews of Chicana/o peoples from Meso-america; the Spanish Conquest; the historical presence of Chicana/o peoples in the Southwest; the rise of the Chicana/o student and community movements; immigration issues; and gender, sexuality and criminalization issues. Formerly CHST 2537. Approved for arts and sciences core curriculum: human diversity or United States context.

**ETHN 2746-3. Chicana/Chicano and Mexican Literature.** Introduces Chicana and Chicano and Mexican literary studies, focusing on narrative works by Chicana and Chicano writers. Examines diverse range of Mexican writing in Greater Mexico as it addresses recurring issues and themes, including language, race and class, questions of identity and gender relations. Formerly CHST 2742. Same as ENGL 2747.

**ETHN 3026-3. Women of Color: Chicanas in U.S. Society.** Critically explores the Chicana experience and identity. Examines issues arising from the intersection of class, race, and gender. Focuses on controversies surrounding culture and gender through an analysis of feminism and feminismo. Prereq., ETHN 2001 or 2536 or equivalent. Formerly CHST 3026.

**ETHN 3106-3. Selected Topics in Chicana and Chicano Studies.** Intensive examination of a particular topic, theme, issue, or problem in Chicana and Chicano studies as chosen by the instructor. May be repeated up to 6 total credit hours within a term on different topics. Prereq., ETHN 2001 or 2536 or equivalent. Formerly CHST 3100.

**ETHN 3136-3. Chicana Feminisms and Knowledges.** Provides insight into the present socioeconomic condition of Chicanas and the concept of feminismo through interdisciplinary study of history, sociology, literary images, and film portrayals. Prereq., ETHN 2001 or 2536 or equivalent. Same as WMST 3135. Formerly CHST 3135. Approved for arts and sciences core curriculum: human diversity.

**ETHN 3826-3. Contemporary Chicana and Chicano Writers.** Covers the most important Chicana and Chicano writers of prose fiction of the past three decades. Considers progression of Chicana and Chicano fiction from naturalism, realism, and romanticism, to post-modernism. Prereqs., ETHN 2001 or 2536 or equivalent. Formerly CHST 3824.

**ETHN 4006-3. Chicana/Chicano and Native American Cultures of the U.S.** Theoretically engaged seminar considers intersections of Chicana/o and Native American studies to shape our scholarly understanding of the U.S. and Mexico borderlands. Uses ethnographies, historical studies, novels, film, and music to understand the complex processes of identity formation. Also considers the impacts of colonially imposed gender formations among Chicana/Chicano and Native American communities. Prereq., ETHN 2001 or 2536 or equivalent. Formerly CHST 4000.

**ETHN 4126-3. The Emergence of Modern Mexico.** Study of Mexican history continues with the establishment of independence in 1821. Examines the upheavals of the Mexican Revolution and culminates with recent events in Mexico. Prereq., ETHN 2001 or 2537 or equivalent. Same as HIST 4128. Formerly CHST 4128.

**ETHN 4306-3. The Chicana and Chicano and U.S. Social Systems.** Gives special attention to ways U.S. institutions (i.e., legal, economic, educational, governmental and social agencies) affect Chicanas and Chicanos. Discusses internal colonialism, institutional racism, assimilation and acculturation, and identity. Prereq., ETHN 2536 or equivalent. Same as ETHN 5306. Formerly CHST 4303.

**ETHN 4686-3. Selected Topics in Chicana and Chicano Studies.** Examines a particular topic, theme, issue, or problem concerning Chicanas and Chicanos. May be repeated up to 6 total credit hours on different topics. Prereq., ETHN 2001 or 2536 or equivalent. Formerly CHST 4681.

**ETHN 5306-3. The Chicana and Chicano and U.S. Social Systems.** Same as ETHN 4306.

## Farrand Residential Academic Program

**FARR 1000-1. Farrand Service-Learning Practicum: Special Topics.** Offers a varying service-learning practicum experience as corequisite to a service-learning lecture course. May be repeated up to 6 total credit hours, provided the practica are different. Graded pass/fail.

**FARR 1001-1. Avant-Garde Film Appreciation.** Provides students with an introduction to the aesthetic and critical concepts surrounding the viewing and appreciation of film art through lecture, discussion and film screenings. Explores primarily non-narrative expressions of film as art. Recommended prereq., FILM 1502.

**FARR 1002-1. Spinning Progress.** Examines the broad notion of progress by focusing on cloth. Mechanization of textile production over the past 250 years announces one "modern" understanding of progress based on speed on efficiency. But, even from the outset of the industrial revolution, competing conceptions of progress grounded on other values contested this "modern" conception. By what understanding are we to assess progress today?

**FARR 1003-1. Banned Books and the First Amendment.** Focuses on a heated topic of discussion since the Constitution was drafted: the censorship of books. This class will look at some classics in literature: *Catcher in the Rye*, *The Color Purple*, and *Huck Finn*, and will explore the questions of why they were controversial and whether censorship of books is ever justified. Graded pass/fail.

**FARR 1004-1. Teen Trials and Tribulations in Literature.** Discusses major themes and literary strategies in coming-of-age literature. Pass/fail only.

**FARR 1513-1. The Individual and the Community.** Examines the relationship between the individual and the community through films, both narrative and documentary. Focuses on the problems and possibilities of losing and/or promoting both community and individuality.

**FARR 1520-1. Theatre Arts Workshop.**

**FARR 1561-1. Nonviolence for Everyday: Meditation and Other Helpful Habits.** Focuses on the challenge of achieving nonviolence on a day-to-day basis by maintaining a peaceful, focused frame of mind. Explores ways to train the mind, including methods that may aid healing.

**FARR 1562-3. Gandhi's *Satyagraha*: Love in Action for Humans and Other Creatures.** Class texts and films explore social justice and structural violence in regard to humans, animals, and the environment in the light of a Gandhian approach to these issues. Outreach work in the community is included.

**FARR 1595-1. Community Service: Personal Growth and Public Good.** Provides an opportunity for students to engage in volunteer service. Provides support and guidance in reflecting on personal and sociological issues that derive from their experiences.

**FARR 2000-3. Farrand Seminar in the Humanities and the Arts.** Studies an aspect of the theme of the Center for Humanities Seminar Program each year, and will be taught by faculty participants in the Center's fellowship program. May be repeated up to 6 total credit hours.

**FARR 2002-3. Literature of Lifewriting.** Examines how diverse writers have created unique personal narratives that shape memory within historical and social contexts. Works will exemplify a wide range of literary structures, themes, and strategies that enhance an understanding of the genre and provide models for students' own lifewriting assignments. Approved for arts and sciences core curriculum: literature and the arts.

**FARR 2100-3. Digital Design Interfaces, Interactivities, and Information Design.** Learn the key components of digital design and how to create unique and informative digital designs. Has immediate application through work in

small groups with nonprofit agencies with whom a website, based on the agency's information and needs, will be designed.

**FARR 2400-3. Understanding Privilege and Oppression in Contemporary Society.** Through a focus on race, class, sexual orientation, and physical ability, this course explores privilege, oppression, and empowerment in the United States. Through community service, students learn how oppression and privilege interact, and apply classroom learning to community experiences. Same as LDSP 2400. Approved for the arts and sciences core curriculum: human diversity or contemporary societies.

**FARR 2510-3. Exploring Good and Evil through Film.** Eighteen films depict our capacities for good and evil. Topics addressed include the following: the Holocaust, Jung's concept of "the Shadow," the Seven Deadly Sins, altruistic and sociopathic personalities, capital punishment, the redemptive narrative, and the satanic in film. Same as FILM 2613. Approved for arts and sciences core curriculum: ideals and values.

**FARR 2660-3. Ethics of Ambition.** Through selected readings in classical literature on ethics and through more contemporary readings and films, examines critical ethical issues relating to the competition of ambitions and the alternative styles of choosing between courses of action in a dangerous world. Uses biographies of those whose lives illustrate both the complexities of the struggles and the profundity of possibilities. Considers the unconscious metaphors of national visions and ambitions, the competing ethics of ends and means, the conflicting ambitions in a pluralistic society, and the transcendent ambitions of visionaries. Same as HONR 2250. Approved for arts and sciences core curriculum: ideals and values.

**FARR 2820-3. Future of the Spaceship Earth.** Examines major ecological, political, economic, cultural, legal, and ethical issues that will shape the future. Students consider how their decisions influence the future, and reflect on fundamental values and ideals underlying the search for solutions to these complex problems. Approved for the arts and sciences core curriculum: ideals and values.

## Film Studies

### Production

**FILM 2000-3. Beginning Filmmaking.** Instructs students in making Super-8 films. Covers use of cameras and editing equipment, basic editing and splicing techniques, and analysis of pertinent films. May emphasize making personal, experimental films or making narrative sound films, according to instructor. Students need to purchase materials and rent the necessary equipment. The Film Studies Program maintains an equipment pool with modest rental fees for students needing equipment. Prereq., FILM 1502 or instructor consent.

**FILM 2010-3. Moving Image Computer Foundations.** Provides students with artistic foundational hands-on experience in integrated use of media software in both the PC and MAC creative imaging making digital working environments. Includes fundamentals in general computer maintenance, creative and practical audio editing, image management and manipulation, and creative moving image practice. Prereq., film major or instructor consent.

**FILM 2300-3. Beginning/Intermediate Filmmaking.** Covers basic camera, editing, and splicing techniques for Super-8 film. Equipment is available at the film studies office for a modest rental fee. Prereq., FILM 1502 or instructor consent.

**FILM 2500-3. Introduction to Cinematography.** Film production class focusing on developing a basic understanding of the aesthetics and principles of Cinematography. Through projects, screenings, and critiques, students learn creative camera lighting processes. Prereqs., FILM 1502 and 2000 or 2300 with an averaged combined grade in these two courses of 3.00, with a minimum overall GPA of 2.0. Restricted to film majors.

**FILM 2610-3. Animation Production.** Includes analysis of independent and experimental animation and an introduction to various animation techniques (object, line, collage, sand or paint on glass, Xerox, cameraless, pixellation, etc.). Students produce exercise films and a final film exploring these techniques. Prereq., FILM 2000. Recommended prereq., FILM 2500 or 2600.

**FILM 2900-3. Lighting.** Covers the basics of "why you need lighting," color temp, as well as camera techniques, lighting theory, and lighting set-ups for

still and motion picture film video. Emphasizes hands on as well as theory. Prereq., FILM 2000 or 2300. Recommended prereq., FILM 1502.

**FILM 3010 (1-3). Film Production Topics.** Offers students both theoretical and practical experience in various specialized areas of cinematic production. Topics vary but include production in the documentary, fictional narrative, animation, computer animation, and experimental genres. May be repeated up to 9 total credit hours. Prereq., FILM 2000 or 2300.

**FILM 3030-3. Cinema Alternative Process.** Explores alternative methods of film processing and filmic image manipulation. Through projects, film screenings, lectures and discussions students will learn fine arts approaches to creative control for the moving image. Prereq., FILM 1502, 2500, 2000 or 2300, or instructor consent. Restricted to BFA majors.

**FILM 3400-3. Cinema Production I.** Exploration of creative cinema production through short production and post-production projects. A short final project will be required. Focuses on the tactics and strategies of independent cinema production, examining a variety of approaches to genre. Explores a range of film and digital technologies. Prereqs., FILM 1502, 2500, and 2000 or 2300. Coreqs., FILM 3515 and 3525. Restricted to BFA film studies majors or instructor consent.

**FILM 3600-3. Digital Post-Production Process.** Through projects, discussions, and screenings, this class explores the practices and aesthetics of computer-based moving-image art editing. Restricted to FMST majors or instructor consent required.

**FILM 3620-3. Experimental Digital Animation.** Instructs students in the making of digital animation. Covers the use of the exposure sheet, frame series manipulation, digital motion techniques, and an analysis of pertinent films. Emphasis is on digital tools to create individual, personal, or experimental animated works. Includes experimental techniques of transfer between digital media and film. Prereq., FILM 2610 or instructor consent. Recommended prereqs., FILM 3030 and FILM 3400 or 3600.

**FILM 3700-3. Digital Audio Design.** Studies and applies Pro Tools as a post-production audio toolbox. Applied techniques include sound recording, sound editing, field recording, foley, vocal recording and editing, plug-in generated sound creation, MIDI, basic scoring principles, audio sweetening, and audio mixing. Students will be required to complete regular editing assignments in addition to a final soundscape project. Prereq., FILM 2000, 2500, and 3400 or 3600. Restricted to BFA majors.

**FILM 3900 (1-3). Independent Study (Production).** May be repeated up to 6 total credit hours.

**FILM 3920-3. Professional Seminar.** Learning aspects of professional development in the field of cinema. Through workshops and assignments students will learn of the many opportunities found within all areas of production. Guests will help inform the students of professional options and expectations. Topics will include: crew work, fund raising, marketing festivals, low budget filmmaking, and alternative venues. Students may have an internship concurrently with this course. May be repeated up to 6 total credit hours. Prereq., FILM 2500 or 2500, or instructor consent. Recommended restriction to BFA film majors.

**FILM 3940 (1-6). Film Studies Internship.** Provides students with professional internship experiences with film, video, new media production companies, governmental agencies, production units, audio recording studios, and new media industries. Students will be responsible for securing their own internship position. May be repeated up to 9 credit hours. Prereqs., must be a BA or BFA film studies major with a CU GPA of at least 2.00, upper-division standing, and a 3.00 GPA as a BA or BFA film studies major. Offered pass/fail only.

**FILM 4000-3. Advanced Digital Postproduction.** Through projects, discussions, and screenings, this class explores the advanced practices and aesthetics of computer-based moving-image art editing. Topics include how to edit and manage a postproduction cycle, how to use digital editing systems and capabilities such as compositing, digital audio, and optical effects treatments. Prereqs., FILM 1502, 2000 or 2300, 2500, 3400 or 3600, or instructor consent. Restricted to BFA FMST majors. Cannot be taken simultaneously with FILM 3400 or 3600. Same as ARTF 5000.

**FILM 4010 (1-3). Topics in Film Studies: Production.** Prepares students for advanced Film Studies production courses. Subject matter varies each se-

mester. May be repeated up to 9 total credit hours, provided the topics are different. Same as ARTF 5010.

**FILM 4030-3. Visiting Filmmakers Seminar.** Examines creative issues in contemporary cinema art. Graduate and advanced undergraduate students explore filmmaking ideas with guest artists within a seminar setting. Filmmakers, videographers and programmers of national and international reputation, with an emphasis on "experimental" practice, interact with graduate and advanced undergraduate students, and discuss their work at seminar meetings, public lectures or events. May be repeated up to 6 total credit hours. Recommended prereqs., FILM 1502 and 4453 or instructor consent. Restricted to FMST, BASA, and ARTC majors. Same as ARTF 5030.

**FILM 4240-3. Beginning Video Production.** Presents a studio course on basic single camera video production strategies and concepts. Through class screenings, projects, demonstrations, discussions, and readings, students gain an introductory familiarity with camera, lighting, sound, editing and the organization and planning involved in a video project. Explores a basic theoretical understanding of video as an art form and its relationship to television, film, art, history, culture. Prereqs., FILM 2000 and 2500 or instructor consent. Same as ARTS 4246.

**FILM 4340-3. Intermediate Video Production.** Continuation of beginning video production. Extends the knowledge of single camera video production strategies and concepts. Expands the concept of montage (editing) and strategies to develop a video project through class screenings, projects, discussions, and readings. Furthers theoretical understanding of video as an art form. Prereq., FILM 4240 or instructor consent. Same as ARTS 4346.

**FILM 4440-3. Advanced Video Production.** Continuation of intermediate video production. Explores advanced technical skills to control the quality of the video image in production, postproduction, and distribution. Emphasizes self-motivated independent projects, conceptual realization of advanced student work and basic working knowledge of distribution and life as a media artist. Promotes further theoretical understanding of video as an art form. May be repeated up to 9 total credit hours. Prereq., FILM 4340 or instructor consent. Same as ARTS 4446.

**FILM 4500-3. Cinema Production 2.** Advanced exploration of creative cinema production through short production and post-production projects. Course focuses on the tactics and strategies of independent cinema production leading to the completion of a BFA thesis project exploring either documentary, experimental, or narrative genres. May be repeated up to 6 total credit hours. Prereq., FILM 3400, 3515, and 3525. Restricted to BFA film studies major or instructor consent. Same as ARTF 5500.

**FILM 4600-3. Creative Digital Cinematography.** Explores creative approaches to single camera digital cinematography through short projects, discussions, and screenings. Relates creative photography and poetic approaches to the digital camera cinema. May be repeated up to 6 total credit hours. Prereqs., FILM 2000, 2500, and 3400 or 3600, or ARTS 4246 or 5346 instructor consent. Restricted to FILM majors. Same as ARTF 5600.

## History

**FILM 2521-3. Classics of the Foreign Film: 1960s to Present.** Surveys the classics of international cinema from the 1960s to the present. Recommended prereq., FILM 1502. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3051-4. Film History 1.** Intensive introduction to film history from 1895 to 1935. Topics covered include the beginnings of motion picture photography, the growth of narrative complexity from Lumiere to Griffith, American silent comedy, Soviet theories of montage, German expressionist films, and the transition to sound. Prereq., FILM 1502.

**FILM 3061-4. Film History 2.** Starts with the late 1930s and early 1940s films of Renoir and Welles and follows the historical growth and evolution of film aesthetics to the present. Studies Italian neorealist, French new wave, and recent experimental films, as well as the films of major auteur figures such as Bergman, Kurosawa, Fellini, Hitchcock, Bunuel, Antonioni, and Coppola. Prereqs., FILM 1502 and 3051, or instructor consent.

**FILM 3081-3. American Film in the 1980s and '90s.** Examines the relationship between American films of the 1980s and '90s and their cultural and histori-

cal context. Includes films by Lynch, Stone, Solondz, Scott, Scorsese, Lee, Dwyne, Lemmons, Tarantino, Altman. Controlled enrollment. Prereqs., FILM 1502, 3051, 3061, and instructor consent.

**FILM 3091-3. Post-War American Film/Culture/Politics.** Examines the relationship between American films from the mid-1940s to the present day and their cultural and historical context. Includes films by Capra, Curtiz, Frankenheimer, Kazan, Kramer, Jewison, Wexler, Pakula, Cimino, Fincher, Lynch, Stone, and Lee. Priority is given to students who have taken both semesters of Film History (FILM 3051 and 3061). Prereqs., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3191-3. "The Golden Age": Film Directors, Actors, and Writers from the Golden Age of Television.** Traces the roots of live television and anthologies of the fifties. Examines several of the most interesting and radical Hollywood directors, writers, and actors of the sixties and seventies who emerged from this "golden age" of television: Frankenheimer, Penn, Altman, Lumet, Cassavetes, Serling, and Chayevsky. Prereq., FILM 1502.

**FILM 3211-3. History of Russian Cinema.** Surveys Russian cinema in historical and cultural context from early 20th century to the present. Prereq., FILM 1502 or RUSS 2221. Same as RUSS 3211. Approved for arts and sciences core curriculum: literature and the arts.

**FILM 3301-3. Contemporary Issues in Russian Film.** Examines the relationship between politics, economics, aesthetics, and the way moral and social issues are treated in noteworthy Russian films from the last 20 years. Same as RUSS 3301.

**FILM 3501-3. Film Production Management.** Familiarizes students with principles of film management techniques as well as problem-solving methodologies developed specifically for the film industry. Emphasizes the technique of production boarding as the central tool in production management as well as budget and contracts information. Offered through Continuing Education. FILM 3501 or 3563 may be used for partial fulfillment of major requirements. Prereq., FILM 2000, COMM 1240, and JOUR 3674.

**FILM 3901 (1-3). Independent Study (Critical Study).** May be repeated up to 6 total credit hours.

**FILM 4001-3. Screening Race, Class, and Gender in the U.S. and the Global Borderland.** Engaging with the ways in which racial, class, gender and sexual oppression intersect, this class examines several filmic productions by and about diasporic and subaltern subjects (especially children and women) in the U.S./Mexico borderlands, and the urban ethnic metropolises of the global borderlands. Prereq., ETHN 2001 or equivalent ETHN course. Same as ETHN 4001.

**FILM 4021-3. Directing/Acting for the Camera.** Offers an intensive workshop that provides students with experience directing dramatic material, acting before a camera, and interpreting or adopting dramatic material for film. No experience in directing or acting required. Attendance, research, and papers required. Recommended prereq., FILM 1502. Same as ARTF5021.

## Genre and Movements

**FILM 1502-3. Introduction to Film Studies.** Introduces the critical study of film, exploring basic theoretical concerns while presenting a survey of important film genres, both narrative and nonnarrative. Lectures may be presented by various faculty members. Considerable amount of writing is required.

**FILM 2312-3. Film Trilogies.** Study of films designed as trilogies, drawing on a wide range of international cinema. Films include Satyajit Ray's *Apu Trilogy* (India), Krzysztof Kieslowski's *Three Colors Trilogy* (Poland), Francois Truffaut's *Antoine Doinel* cycle (France), and Abbas Kiarostami's *Iran Trilogy* (Iran). Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 2412-3. Melodrama and Culture.** Explores the evolution of melodrama as a film genre from the 1910s to the Hollywood classical era and contemporary cinema, and the genre's adaptability to different historical cultural contexts outside of American cinema. Analyzes the political and cultural functions of melodrama in contexts ranging from classical Hollywood to Latin American cinema, from European films of the 1960s to revisionist films of the 1990s. Prereq., FILM 1502. Recommended prereq., FILM 3051. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3002-3. Major Film Movements.** Historical-aesthetic survey dealing with various national cinemas, taught in conjunction with the appropriate language department. Typical offerings are the French film, the German film, the Russian film, and so on. Also offers a more detailed approach to a more restricted subject, i.e., film comedy, women filmmakers, German expressionist cinema, Italian neorealism. May be repeated up to 12 total credit hours within the same term with departmental consent. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3012-3. Documentary Film.** Provides a historical and theoretical introduction to the documentary film. Examines the historical beginnings of documentary film as well as exploring contemporary documentary practice. Canonical moments of documentary history and lesser known examples of documentary film work will be explored. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3022-3. Jung, Film, and Literature.** The basic themes of C. G. Jung's archetypal psychology (shadow, anima/animus, character typology, and individuation) are studied and applied as tools of critical analysis to selected films and literary texts of the modern period. Prereq., instructor consent. Same as HUMN 3015.

**FILM 3032-3. Stage Tragedy and Film.** Presents an aerial survey of the history of Western drama as represented in film: Greek drama, the Elizabethans, Ibsen/Strindberg to O'Neill/Williams, Beckett, etc. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3042-3. Horror Film.** Serious investigation of the horror film genre as well as its origins in, and relation to, works of romanticist literature (e.g., Poe, Shelley). Issues include: the relation of fantasy and reality; gender in horror film; psychological issues raised by the films; historical issues generated by the genre. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 3402-3. European Film and Culture.** Studies the relationships between European film, art, and culture. Offered each summer in a different European city (viz, Rome, Paris, London, Athens, Barcelona). There will be regular in-class lectures, film screenings, field trips, and on-site teaching. May be repeated up to 12 total credit hours. Recommended prereq., introductory film and art history courses. Approved for arts and sciences core curriculum: literature and the arts.

**FILM 3422-3. Genre: The Hollywood Musical.** Second only to jazz, some critics regard the Hollywood musical as the greatest American popular art form of the 20th century. This course proposes a historical, formal, and theoretical approach to the musical through its several iterations, from the classical, to the revisionist, to the unusual, placing the changes in the genre's form, structure, and ideology in the context of America's changing social, political, and religious values. Prereq., FILM 1502. Recommended prereq., FILM 3051.

## Topics

**FILM 2003-3. Film Topics.** Varying topics on important individuals, historical developments, groupings of films, film directors, critical and theoretical issues in film. May be repeated up to 9 total credit hours, provided the topics are different.

**FILM 2513-3. Major Asian Filmmakers.** Surveys the major Asian directors from China, India, Japan, Taiwan, and Vietnam. Recommended prereq., FILM 1502. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 2613-3. Exploring Good and Evil through Film.** Eighteen films depict our capacities for good and evil. Topics addressed include the following: the Holocaust, Jung's concept of "the Shadow," the Seven Deadly Sins, altruistic and sociopathic personalities, capital punishment, the redemptive narrative, and the satanic in film. Same as FARR 2510. Approved for arts and sciences core curriculum: ideals and values.

**FILM 3003-3. Major Film Directors.** Focuses on the work of a single director or a group of related directors. Course content varies each semester. Consult the online Schedule Planner for specific topic. May be repeated up to 12 total credit hours with departmental consent. May be used for partial fulfillment of a college requirement only once. Restricted to FILM/FMST majors. Non-majors need instructor consent.

**FILM 3013-3. Women and Film.** Examines the representation of women both in mainstream movies and in women's counter-cinema that resists traditional form, content, and spectator-text relationships of Hollywood models. Emphasizes work by key women filmmakers such as Margarethe Von Trotta, Lizzy Borden, and Yvonne Rainer, as well as readings in feminist film theory. Approved for arts and sciences core curriculum: human diversity.

**FILM 3033-3. Color and Cinema.** Examines color and cinema from historical, technological, aesthetic and theoretical perspectives. Students will be required to complete both creative and scholarly assignments.

**FILM 3043-3. Topics in Critical Film Studies.** Lect. and lab. Prepares students for advanced Film Critical Studies work. Subject matter varies from semester to semester. May be repeated up to 9 total credit hours, provided topics are different. Prereq., FILM 1502 or instructor consent. Restricted to FILM or FMST majors.

**FILM 3503-3. German Film Through World War II.** History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English. Same as GRMN 3503.

**FILM 3513-3. German Film and Society 1945–1989.** Introduces issues in German society through film during the Cold War. Focus on East and West Germany, though some other German language films may be included. Emphasis is on reading films in their social, historical, and political contexts. Taught in English. Same as GRMN 3513.

**FILM 3563-3. Producing the Film.** Focuses on the production process of movie making from idea through distribution, analyzing each of the five phases involved, including the major players, function and problems inherent in each. Emphasizes the critical role the script plays in this process. Designed to give students a "map of the minefield" before venturing out on their own. Offered through Continuing Education.

**FILM 3603-3. Sound and Vision.** Historical and aesthetic overview of sound in relation to film, ranging from Hitchcock's *Blackmail* to Mailick's *The Thin Red Line*. Pursues issues in sound design, mixing film scores, voiceovers, and film/sound theory in narrative, experimental, and documentary films. Among the filmmakers to be studied are Vertov, Welles, Altman, Brakhage, Lipsett, Eisenstein, Coppola, Scorsese, Stone, Leone, Godard, Nelson. Also explores a limited practicum using Pro Tools for sound design. Prereq., FILM 1502. Recommended prereq., FILM 3051.

**FILM 4003-3. Film and Fiction.** Explores similarities and differences between literature and film as narrative arts. Studies several novels, short stories, and plays and films made from them. Examines problems in point of view, manipulation of time, tone, structure, and setting. Same as ARTF 5003.

**FILM 4013-3. Film, Photography, and Modernism.** Provides interdisciplinary study of film, photography, and modernism, focusing on issues such as dystopia, alienation, sexuality, subjectivity, and self-referentiality. Photographs by Stieglitz, Strand, Weston, Evans, Cartier-Bresson, Kertesz, and Moholy-Nagy. Films by Dziga-Vertov, Eisenstein, Resnais, Antonioni, Bergman, Bunuel, and Bertolucci. Prereq., FILM 1502. Recommended prereq., FILM 3051. Same as ARTF 5013.

**FILM 4023-3. Topics in International Cinema.** Focuses on major international filmmakers who have had a decisive impact on world cinema. Students will learn how directors create their own innovative body of work with specific formal and thematic patterns, and will also learn to place such work within multiple frameworks that will cover film history, theory, aesthetics, philosophy, and social and cultural analysis. May be repeated up to 6 total credit hours provided topics are different. Prereq., FILM 1502. Recommended prereqs., FILM 3051 and 3061. Restricted to FILM, FMST, ARTC majors. Same as ARTF 5023.

**FILM 4043 (1-3). Topics in Film Studies: Critical Studies.** Prepares students for advanced Film Studies critical studies courses. Subject matter varies each semester. May be repeated up to 9 total credit hours, provided the topics are different. Same as ARTF 5043.

**FILM 4453-3. Elective Affinities: Avant-Garde Film and the Arts.** Traces the history and aesthetics of avant-garde/experimental films in light of similar ideas found in the other arts, particularly painting, poetry, photography and music. Topics covered include Dada and the early avant-garde; surrealism and psychodramas; Brakhage and abstract expressionism; feminist arts and film since the 1980s; the idea of the sublime in painting, music, and film; landscape

in painting, photography, and film; post-modernism and the cinema; queer theory, gender/identity politics, and aesthetics of recent films; and specific multiple disciplinary artists such as Andy Warhol, Michael Snow, Helen Levitt, and Gunvor Nelson. Prereq., FILM 1502. Same as ARTF 5453.

## Intensive and Small Courses

**FILM 3004-3. Films of Alfred Hitchcock.** Intensive, critical investigation of the films of one of cinema's greatest directors, Alfred Hitchcock. Concepts to be examined include authorship, desire, gender, and film acting. Critical and theoretical writings about Hitchcock are explored. Paper and exams required. Restricted to FILM/FMST majors. Non-majors will need instructor's consent.

**FILM 3104-3. Film Criticism and Theory.** Surveys the range and function of film criticism, introduces major positions and concepts of film theory, and focuses on students' abilities to write about film. Prereq., FILM 1502. Restricted to FILM, FMST, and HUMN majors. Same as HUMN 3104.

**FILM 3504-3. Topics in German Film.** Analyzes key issues in German culture as they are represented in film and other media, e.g., technology, architecture, women, and the Holocaust. Taught in English. May be repeated up to 6 total credit hours provided the topics are different. Same as GRMN 3504.

**FILM 3514-3. German Film and Society after 1989.** Introduces post-1989 German culture through film. The course emphasizes films in their socio-historical contexts and explores developments in German culture during and after the unification. Taught in English. Same as GRMN 3514.

**FILM 4004-3. Topics in Film Theory.** Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers, and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials. May be repeated up to 6 total credit hours. Prereq., FILM 3051 or instructor consent. Restricted to senior FILM, FMST, or HUMN majors. Same as HUMN 4004 and ARTF 5004.

**FILM 4024-3. Advanced Research Seminar.** Focuses on a specific topic, director, or genre chosen by the professor. Research skills and critical thinking are emphasized. With faculty guidance, students determine individual projects and present them to the class. Class participation is mandatory. Each student submits a thorough and original research paper for a final grade. May be repeated up to 6 total credit hours. Prereq., FILM 1502. Recommended prereqs., FILM 3051, 3061. Same as ARTF 5024.

**FILM 4604-3. Colloquium in Film Aesthetics.** Seminar for the serious round table discussion and critique of film as an art form, emphasizing development of appropriate verbal and written language skills for description of film. May be repeated up to 6 total credit hours. Restricted to juniors/seniors. Same as ARTF 5604.

## Workshops

**FILM 2005-3. Movies and Screenplay Analysis.** Analyzes the narrative structure of films and screenplays. Familiarizes students with the specific narrative characteristics of the classic motion picture, the three-act structure, and the multiple tasks involved in the process of adaptation. Dissects the form and structure of feature films through analyzing movies and screenplays. Prereq., FILM 1502.

**FILM 2105-3. Introduction to the Screenplay.** Explores, through close reading and original student work, the form and structure of the screenplay from the writer's perspective. Students will begin by analyzing structural and character elements of such screenplays as *Chinatown* and *Witness*, then analyze screenplays of their choosing. Students will learn the basics of screenwriting form, then develop and write 10 minutes of an original screenplay. Prereq., FILM 1502.

**FILM 3005-3. Issues in Film Comedy.** Film comedies constitute one of cinema's most accomplished genres. This is a critical, historical, and theoretical investigation of silent, classical, and contemporary film comedy. Works by Chaplin, Keaton, Hawks, Cukor, Woody Allen, and others will be explored. Papers, exams required. Recommended prereq., FILM 1502.

**FILM 3515-1. Camera Workshop.** Three intensive workshops focusing on the development of independent cinema production and post-production skills. The instructor must certify students in order to continue with their BFA

studies. Prereqs., FILM 1502, 2500, and 2000 or 2300. Coreq., FILM 3400. Restricted to BFA film studies majors.

**FILM 3525-1. Cinema Editing Workshop.** Three intensive workshops focusing on the development of independent cinema post-production skills. The instructor must certify students in order to continue with their BFA studies. Prereqs., FILM 1502, 2500, and 2000 or 2300. Coreq., FILM 3400. Restricted to BFA film studies majors.

**FILM 4005-3. Screenwriting: Short Form.** A writing intensive course that focuses on the art of the short form screenplay. Students will complete regular writing exercises, presentations, and several short scripts. May be repeated up to 6 total credit hours. Prereq., FILM 3400 or 3600. BFAs only.

**FILM 4075-3. Scriptwriting Workshop.** Designed to give students practical criticism of their script writing and technical format requirements. Either stage plays or screenplays are studied, as announced. May be repeated up to 9 total credit hours. Prereq., instructor consent based on submission of manuscript. Same as ENGL 4071.

**FILM 4105-3. Advanced Screenwriting.** Introduces professional screenwriting, in the form of a creative writing workshop. Admission by portfolio (see film department). Students write scenes and scripts for short films, feature treatments, etc., and are graded on a final portfolio. Prereq., approved writing sample. Recommended prereqs., FILM 3051 and 3061. Same as ARTF 5105.

**FILM 4505-3. Screenwriting: Long Form.** Creative writing workshop in which students plan and write a feature-length screenplay with emphasis on format, dialogue, characterization, and story. Prereqs., FILM 1502 and 2000. Recommended prereq., FILM 2600.

## French and Italian

### French

**FREN 1010-5. Beginning French 1.** For students with no previous knowledge of French. Presents basic grammar and most commonly used French vocabulary. Introduces students to Francophone culture. Credit not granted for this course and FREN 1050.

**FREN 1020-5. Beginning French 2.** Continuation of FREN 1010. Completes the presentation of most basic structures and French vocabulary. Prereq., successful completion of one semester of college-level French or two years of high school French. Credit not granted for this course and FREN 1050.

**FREN 1050-5. Beginning French Review.** Covers the material of FREN 1010 and 1020 in one accelerated semester. Intended for students who know some French (i.e., four to five semesters in high school) but do not have skills adequate for 2000-level courses. Credit not granted for this course and FREN 1010 or FREN 1020.

**FREN 1200-3. Medieval Epic and Romance.** Covers the most important works of medieval literature, in English translation. Among the texts studied are the Nibelungenlied, the Song of Roland, and Arthurian romances, including the stories of Lancelot and Guinevere and Tristan and Isolde. Offers a general introduction for nonmajors to medieval literature and society. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 1400-3. Medieval/Renaissance Women Writers in Italy and France.** Introduces major literature through close readings of women's writings in their historical context. Offers a general introduction to women's status and roles in Italy and France. Taught in English. Same as ITAL 1400. Approved for arts and sciences core curriculum: human diversity.

**FREN 1500-3. Literature and Politics in the Age of Enlightenment.** Introduces political dimensions of 18th century French literature. Surveys political and social preoccupations that manifest themselves across genres (novels, scientific treatises, dialogues, erotic literature, etc.). Examines contributions made by 18th century French writers to the sociological and political imagination of Western tradition. Taught in English.

**FREN 1700-3. Francophone Literature in Translation.** Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and Canada. Gives special attention to oral tradition, identity, question, and cultural conflict. Taught in English.

**FREN 1750-3. French Colonialism: North Africa and the Middle East.** Offers a general introduction to French and Francophone literature and visual arts (painting, photography, film) from the 19th century to the present depicting cultures and societies of the Middle East and North Africa. In English with English translations of French texts. Approved for arts and sciences core curriculum: human diversity.

**FREN 1800-3. Contemporary French Literature in Translation.** Reviews the major philosophical, political, and aesthetic issues in the 20th century French novel and drama. Beginning with existentialist literature, discussion focuses subsequently on the Theatre of the Absurd, the new novel, World War II and the Holocaust, and recent women writers. Taught in English.

**FREN 1900-3. Modern Paris in Literature, Photographs, Paintings, and Movies.** Introduces the rise of modern Paris from the French Revolution (1789) to today. Studies the physical and sociological changes of the city in terms of architecture and industrialization through French literature, movies, paintings and photographs. Addresses problems due to the magnitude of the city, the growing fear of urban vices, and the dilemma of controlling massive urban populations. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 2110-3. Second-Year French Grammar Review and Reading 1.** A film based curriculum will expand the knowledge of francophone culture and will continue the development of communication skills begun in the first year. This third semester course will review essential beginning grammar before introducing intermediate structures, vocabulary, and cultural/literary readings. Prereqs., FREN 1020 or 1050 (min. grade C-) or equivalent. Meets MAPS requirement for foreign language. Satisfies arts and sciences foreign language requirement.

**FREN 2120-3. Second-Year French Grammar Review and Reading 2.** Completes the film-based study of intermediate grammar begun in FREN 2110. Continued reading in French literature and culture, with considerable practice in writing and speaking French. Prereq., FREN 2110 (min. grade C-). Fulfills the Graduate School language requirement for the PhD.

**FREN 2500-3. Conversation in French.** Puts into practice all that has been learned in the first four semesters of college French. Builds conversational skills and confidence through acquisition of new vocabulary and a review of grammar essential to discussing different aspects of French culture. All work is in French. Prereq., FREN 2120 or equivalent.

**FREN 3010-3. French Phonetics and Pronunciation.** Improves students' ability to pronounce French correctly. Coursework involves the International Phonetic Alphabet, understanding the differences between pairs of sounds, and recognizing the relationship between spelling and pronunciation. Required of all FREN majors. Prereq., FREN 2120 or equivalent.

**FREN 3020-3. French Phonetics Through Musical Performance.** Advanced oral practice and interpretation of a French Musical. This course of applied and corrective phonetics concentrates on developing good pronunciation and fluency through song. The course culminates with a public presentation of the musical studied in class. Prereq., FREN 3010 or equivalent and instructor consent. Restricted to sophomores/juniors/seniors.

**FREN 3050-3. French Composition 1.** French third-year level composition course. Students practice and write different forms of formal French writing. They also hone their grammar skills and analytical reading of short literature pieces. Must be taken before FREN 3060. Required for French majors. Prereq., FREN 2120 or equivalent.

**FREN 3060-3. French Composition 2.** The second semester of a French third-year level composition course. Students build on their previous knowledge of formal writing in French and more emphasis is given to argumentative and analytical style of writing in FREN 3060. Prereq., FREN 3050 or equivalent. Required for French majors.

**FREN 3100-3. Introduction to Critical Reading and Writing in French Literature.** Study of French literature through close readings of representative examples of major literary forms (poetry, fiction, drama, essay) and through the composition of critical writings in French. Required for French majors. Prereq., FREN 3060.

**FREN 3110-3. Main Currents of French Literature 1.** Surveys French literature from the Middle Ages through the 18th century. Students are expected to acquire a fairly detailed knowledge of principal writers and schools of the

periods covered. Required for majors. Prereq., FREN 3100. May be taken with FREN 3120. Restricted to sophomores/juniors/seniors.

**FREN 3120-3. Main Currents of French Literature 2.** Surveys 19th and 20th century French literature. Close reading of selected texts of the principal writers and schools. Required for majors. Prereq., FREN 3100. May be taken before, after, or with FREN 3110. Restricted to sophomores/juniors/seniors.

**FREN 3200-3. Introduction to Literary Theory and Advanced Critical Analysis.** Introduces important aspects of both classical and modern literary theory as an aid to reading and understanding literary texts. Covers theoretical works by figures ranging from Plato and Aristotle to modern French critics such as Barthes, Foucault, and Derrida in conjunction with selected literary works. Offers students more sophisticated means of understanding issues like gender, ethnicity, the roles of both author and reader in constructing meaning, the nature and functions of signs, and the relationship between literature and the larger society. Conducted in English, though French majors are required to read the texts in the original language. Required for students taking honors in French or Italian. Prereq., FREN 3100 or instructor consent. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 3500-3. French Current Events: Conversation and Composition.** For students who have spent fewer than four months in a French-speaking environment. Focuses on presentations, debates, discussions, readings, and written work. Prereq., FREN 3060 or equivalent.

**FREN 3600-3. Business French 1.** Gives students the tools needed to function in a French-speaking work environment. A culminating project involves creating a business in a francophone country. Prereq., FREN 2120 or equivalent.

**FREN 3700-3. French-American Cultural Differences.** Through readings, films, discussion, and activities, students learn the defining values of their own country, those of France, and key differences between the two cultures. Taught in French. Prereq., FREN 3060 or equivalent.

**FREN 3800-3. France and the Muslim World.** Introduces students to the polemic colonial, social, and cultural interactions of France and Islam. Close attention will be paid to paradigms of identities of one of the major European nations and the Islamic world. Readings and discussion topics for this course cover the social, cultural, and literary depictions of Islamic and French interactions, negotiations, and contradictions. Taught in English. Restricted to juniors and seniors. Cannot be used for French major or minor credit. Approved for arts and sciences core curriculum: human diversity.

**NOTE: Prereqs. for the following courses (except FREN 4200) are FREN 3100, 3110, and 3120 or instructor consent.**

**FREN 4030-3. Advanced Oral Practice and Interpreting.** Concentrates on developing (or preserving) speaking fluency, correct pronunciation, and a good working vocabulary. May be repeated once for credit. Prereq., FREN 3060 and/or 3500, or instructor consent.

**FREN 4050-3. Business French 2.** Explores case studies of French companies with an emphasis on vocabulary, communication skills, and the way cultural differences affect the international business environment. Prereq., FREN 3600 or instructor consent.

**FREN 4110-3. French Special Topics.** Topics vary each semester. Consult the online Schedule Planner for specific topics. See also FREN 4120.

**FREN 4120-3. French Special Topics.** Topics vary each semester. Consult the online Schedule Planner for specific topics. See also FREN 4110.

**FREN 4170-3. Francophone Literature.** Studies the literary expression of French-speaking peoples of Africa, the Caribbean, and French Canada. Gives special attention to oral tradition, identity question, and cultural conflict. Prereqs., FREN 3100, 3110, and 3120, or instructor consent. Restricted to sophomores/juniors/seniors.

**FREN 4200-3. Studies in Contemporary French Culture.** Through a wide variety of texts and audio-visual documents, students learn the structures of contemporary French society and study the cultural phenomena of that society. Prereqs., FREN 3050 and 3060.

**FREN 4250-3. Medieval and Renaissance Readings.** Explores the complex and evolving cultural and historical contexts of medieval and Renaissance French. Introduces the masterpieces of French medieval and Renaissance literature, including the *Chanson de Roland* and Arthurian romance. Also

focuses on the work of Marie de France, Guillaume de Lorris, and Jean de Meun, Christine de Pisan, Machaut, Villon, Louise Labe, and the poets of the Pliade, Rabelais, and Montaigne. Prereqs., FREN 3100, 3110, and 3120 or instructor consent.

**FREN 4300-3. Theatre and Modernity in 17th Century France.** Readings of plays by Corneille, Moliere, and Racine introduce students to theatre's role as a mirror of the multifarious tensions shaping modern Western experience. Taught in English with English translations. Approved for arts and sciences core curriculum: literature and the arts.

**FREN 4330-3. Moliere and 17th Century French Comedy.** Close readings of farces and comedies of Moliere in context with selected comedies by Corneille, Rotrou, and Cyrano de Bergerac and selected satires by Boileau and La Fontaine. Themes include comedy as a form of social criticism and the socio-cultural significance of such episodes of Moliere's career as the scandalous quarrels of *L'Ecole des Femmes* and *Tartuffe*. Prereqs., FREN 3100, 3110, and 3120 or instructor consent.

**FREN 4350-3. French Enlightenment.** Studies fiction, essays, theatre, and philosophical tales. Emphasizes the Enlightenment in France through the texts of its major representatives: Montesquieu, Voltaire, Marivaux, Diderot, and Rousseau. Prereqs., FREN 3100, 3110, and 3120, or instructor consent.

**FREN 4360-3. Survey of 18th Century French Literature.** Close readings of texts by Voltaire, Rousseau, Diderot, Marivaux, and Beaumarchais. Focuses on the evolution of literary genres and the influence of philosophy, politics, and social change on belles lettres. Prereqs., FREN 3100, 3110, and 3120, or instructor consent.

**FREN 4430-3. Survey of 19th Century French Literature.** Examines fiction, poetry, and theatre in 19th century France. Focuses on developing and changing literary styles and subject matter throughout the century in historical, philosophical, and social context. Prereqs., FREN 3100, 3110, and 3120, or instructor consent. Restricted to sophomores/juniors/seniors.

**FREN 4470-3. 20th Century French Theatre and Poetry.** Close readings of plays from the turn of the century to the contemporary period introduce the principal themes and techniques of modernist and postmodernist French theatre. Students are encouraged to consider problems commonly evoked by these texts, and to compare the positions that each text takes on such problems as the status and uses of language, the function and limits of the theatre, and the dialectic of appearance and reality. Prereqs., FREN 3100, 3110, and 3120, or instructor consent.

**FREN 4480-3. 20th Century French Novel.** Close readings of novels from the 1930s to the contemporary period introduce the principal themes and techniques of the modernist and postmodernist French novel. Students are encouraged to analyze a variety of questions commonly evoked in these texts, such as the problem of representation, the uses and abuses of writing, the relation of fiction and history, and the status of the subject in the world. Prereqs., FREN 3100, 3110, and 3120 or instructor consent.

**FREN 4600-3. Topics in French Film.** Covers various topics in the French and some other Francophone cinemas (Belgian, Swiss, Quebecois) from 1895 to the present. Focuses on periods, schools, themes, and directors from Melies to Duras, and the critical approaches by which they are studied. Varies from year to year. May be repeated up to 6 total credit hours on different topics. Prereqs., junior standing and 6 hours in French literature, other literature, or film studies.

**FREN 4750-3. Methods of Teaching French and Professional Orientation.** Presents current methodology and techniques for teaching foreign language for proficiency. Areas of study include ACTFL guidelines, National Standards, assessment, classroom activities, curriculum, and syllabus design. Prereqs., FREN 3100, 3110 or 3120, an additional course above FREN 3060, and admission to the teacher licensure program or instructor consent. Restricted to juniors/seniors.

**FREN 4800-3. Postmodernist French Novel in Translation.** Focuses upon recent innovations in the French novel, and upon the postmodernist literary aesthetic. Students will examine a variety of avant-garde novels, and analyze the kinds of literary experimentation that those novels propose. They will be asked to consider a series of questions concerning the changing nature of literary



representation and the status of the novel as a cultural form. Taught in English. Restricted to juniors/seniors. Cannot be used for major or minor credit.

**FREN 4840 (1-6). Independent Study: Language.** Upon consultation only and at the undergraduate level. May be repeated up to 7 total credit hours.

**FREN 4860-3. War, Trauma, and Memory: Amnesias, Revisions, and Representations of Traumatic History.** Attempts to investigate how extreme historical events (war, genocides, terror attacks) function as “trauma” and how these extreme events are dealt with by personal and collective memory in historical narratives, literary and cinematic fiction, and memorials. Amnesia and other types of historical negations or revisions will be analyzed, along with representations of trauma and the difficulties raised by this memorializing. Taught in English. Restricted to juniors/seniors. Cannot be used for major or minor credit. Approved for arts and sciences core curriculum: ideals and values.

**FREN 4960-6. High School French Teaching.** Offered as part of the supervised student teaching in a secondary school required for state licensure to teach French. These hours do not count toward student hours in the major nor in the maximum departmental hours allowed. Prereq., FREN 4750 or 5770 and admission to the secondary teaching education program. Coreq., EDUC 4712. Restricted to sophomores, juniors, and seniors. Pass/fail only.

**FREN 4980-3. French Senior Honors Thesis.** The senior honor thesis is a 40 to 45 page original research paper, written in French, and constitutes a requirement for graduating with departmental honors. Prereqs., all third-year course requirements including FREN 3200. Recommended prereq., at least one course numbered FREN 4100 or above.

**FREN 4990-3. Senior Seminar.** Preparation of a 15-page research paper in French presented to two members of the department faculty and defended orally in class. Prereq., all third-year requirements and advisor consent. Recommended prereq., at least one course numbered FREN 4100 or above.

**FREN 5110-3. French Special Topics.** Different topics are offered and, in a number of cases, cross-listed with other departments. Prereq., graduate standing or instructor consent. May be repeated up to 6 total credit hours on different topics.

**FREN 5120-3. French Special Topics.** Different topics are offered and, in a number of cases, cross-listed with other departments. Prereq., graduate standing or instructor consent. May be repeated up to 6 total credit hours on different topics.

**FREN 5170-3. Francophone African Literature.** Prereq., graduate standing or instructor consent.

**FREN 5250-3. Medieval and Renaissance Readings.** Through close readings of masterpieces of French medieval and Renaissance literature in conjunction with contemporary criticism and theory, explores the contexts of medieval and Renaissance France. Readings in French. May be taught in English to accommodate students in other programs. May be repeated up to 12 total credit hours on different topics. Prereq., graduate standing or instructor consent.

**FREN 5310-3. 17th Century French Tragedy and Poetry.** Close readings of tragedies by (among others) Corneille and Racine, placed in the context of baroque and neoclassical political and artistic culture as illustrated by philosophy, painting, and science. Drawing on recent criticism and theory, explores heroic drama’s role as a symptom and agent of early modern French social and intellectual history. Readings in French, but may be taught in English. Prereq., graduate standing or instructor consent.

**FREN 5320-3. 17th Century French Prose.** Close readings of major works by, e.g., Descartes, Pascal, La Fayette, La Rochefoucauld, and La Bruyere. Themes include 17th century theories of self, early modern epistemology, notions of honnetete and the critical analysis of human motives and behavior, the emerging novel, and the critique of heroic idealism and of the monarchic absolutism of the Sun King, Louis XIV. Readings in French, but may be taught in English. Prereq., graduate standing or instructor consent.

**FREN 5330-3. Moliere and 17th Century French Comedy.** Close readings of the comedies in context with the works of, e.g., Corneille, Rotrou, Cyrano, Boileau, and La Fontaine. Themes include Moliere and the institution of literary authorship, comedy’s role as social critique, the deconstruction of the early modern subject, and the cultural politics of the scandals surrounding *L’Ecole des femmes* and *Tartuffe*. Readings in French, but may be taught in English. Prereq., graduate standing or instructor consent.

**FREN 5350-3. French Enlightenment.** Focuses on the uses of literature to address the revolutionary philosophical, scientific, religious, and/or socio-political questions of the day. Explores Diderot and d’Alembert’s *Encyclopedie*, Voltaire and Diderot’s philosophical tales and dialogues, Rousseau’s *Discours*, and other writings. Discusses the development of specific literary forms to promote the ideas and goals of the philosophers to reach a changing and diverse readership and to fight censorship. Prereq., graduate standing or instructor consent.

**FREN 5360-3. 18th Century French Literature.** Focuses on the study of a specific literary genre (e.g., theatre, the novel) or on the global production of a major author (e.g., Voltaire, Diderot, Rousseau). Discussion stresses both the uniqueness of the genre/writer and their significance as representatives of the century’s changing society and culture. May be repeated up to 6 total credit hours during a student’s graduate career. Prereq., graduate standing or instructor consent.

**FREN 5420-3. 19th Century French Literature.** A survey of principal works and movements, intended as an introductory course. Prereq., graduate standing or instructor consent.

**FREN 5430-3. Topics in 19th Century French Prose, Poetry, and Theatre.** Topics vary. May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**FREN 5440-3. Literary Ludics.** Taught in French and English. Focuses on literary structures proposed by author to reader as games. Considers critical texts, both practical and theoretical, with a view toward defining the relation between criticism and its objects. Prereq., graduate standing or instructor consent.

**FREN 5470-3. 20th Century French Theatre and Poetry.** Prereq., graduate standing or instructor consent.

**FREN 5770-2. College Foreign Language Teaching.** Required for teaching assistants and graduate part-time instructors. Prereq., graduate standing or instructor consent.

**FREN 6840 (1-3). Independent Study.** May be repeated up to 3 total credit hours, except with permission of the director of graduate studies. Prereq., graduate standing or instructor consent.

**FREN 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Italian

**ITAL 1010-5. Beginning Italian 1.** The four skills of listening, speaking, reading, and writing are progressively developed in a predominantly oral presentation. Grammatical concepts are explained and practiced through dialogues, written exercises, and conversations. The cultural focus is on the personal world and life of students.

**ITAL 1020-5. Beginning Italian 2.** Continuation of ITAL 1010, with more difficult grammatical concepts explored. The cultural focus shifts to social and civic areas. Prereq., ITAL 1010 (min. grade C-).

**ITAL 1400-3. Medieval/Renaissance Women Writers in Italy and France.** Introduces major literature through close readings of women’s writings in their historical context. Offers a general introduction to women’s status and roles in Italy and France. Taught in English. Same as FREN 1400. Approved for arts and sciences core curriculum: human diversity.

**ITAL 1500-3. That’s Amore: Introduction to Italian Culture.** Introduces students to representations of Italian society that have persisted through the ages. The course readings allow students to better understand how certain stereotypes about Italian society (e.g., Latin lover, Mafia) were born and persist in the present. Restricted to freshmen and sophomores. Approved for arts and sciences core curriculum: contemporary societies. Taught in English.

**ITAL 1600-3. Strategies of Fear: Introduction to Italian Fantastic Literature.** Traces the development of the fantastic theme in Italian Literature from its origins (late 19th century) to contemporary times. Analyzes the modes of reception and appropriation of non-Italian gothic and fantastic narrative traditions through which Italian writers have subverted the national literary

model proposed by realist narrative. Approved for arts and sciences core curriculum: literature and the arts. Taught in English.

**ITAL 2110-3. Intermediate Italian Reading, Grammar, and Composition 1.**

Enhances the skills learned in the first-year course and develops greater fluency in understanding and speaking. More emphasis is placed on reading and writing through the use of activities featuring cultural themes that present a realistic portrait of contemporary Italy. Taught in Italian. Prereq., ITAL 1020 (min. grade C-). Meets MAPS requirement for foreign language.

**ITAL 2120-3. Intermediate Italian Reading, Grammar, and Composition 2.**

Continuation of ITAL 2110. Some reading in Italian literature and culture with considerable practice in writing and speaking Italian. Fulfills the Graduate School language requirement for the PhD. Prereq., ITAL 2110 (min. grade C-) or equivalent.

**ITAL 2130-3. Introduction to Literary Analysis.** Increases student's ability to read and analyze literary texts by improving vocabulary and terminology. Students read short stories, essays, short plays, and poems to acquire critical skills and improve expression of opinions and arguments in Italian. Taught in Italian. Prereq or coreq., ITAL 2120 (min. grade C-) or instructor consent required.

**ITAL 3010-3. Advanced Composition and Conversation 1.** Builds vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian. Exercises and themes are drawn primarily from current events and politics (e.g., print and broadcast news) and contemporary culture (e.g., magazines, films, and video). Prereq., ITAL 2120 (min. grade C-), or instructor consent.

**ITAL 3020-3. Advanced Composition and Conversation 2.** Improves vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian. Exercises and themes are drawn primarily from Italian cultural history. Prereq., ITAL 3010 (min. grade C-) or instructor consent.

**ITAL 3030-3. Storia dell'arte: Advanced Composition/Conversation 3.** Improves vocabulary and fluency in spoken Italian, and competence and confidence in correct and more sophisticated written Italian through the study of the history of Italian art. Exercises and themes focus on Italian Classical, Medieval, Renaissance, and Modern Art. Prereq., ITAL 2130 or 3010 (min. grade C-). Instructor consent is required.

**ITAL 3040-3. Italian Conversation through Cinema.** Taught in Italian, the course covers various topics of Italian Cinema from WWII to the present. Focus is on periods, genres, themes, and auteur/directors. Emphasis on review of language structures previously learned and acquisition of new vocabulary to enable students to discuss different aspects of Italian culture, in Italian. Prereq., ITAL 2120 (min. grade C-) or equivalent. Instructor consent is required.

**ITAL 3140-3. Readings in Italian Literature: 20th Century.** Covers a selected reading of major texts, prose, and poetry of 20th century literature. Emphasizes critical reading and analysis of modern and contemporary Italian literature in its literary and historical context. Taught in Italian. Prereq., ITAL 2130 (min. grade of C-), or instructor consent.

**ITAL 3150-3. Readings in Italian Literature: 19th Century.** Introduces students to 19th century literary history through a selected reading of major texts, prose, and poetry. Emphasizes critical reading and analysis of Italian literature in its literary and historical context. Taught in Italian. Prereq., ITAL 2130 (min. grade C-), or instructor consent.

**ITAL 3160-3. Readings in Italian Literature: Medieval and Renaissance.**

Covers a selected reading of major texts, prose, and poetry of Medieval and Renaissance literature. Emphasizes critical reading and analysis of texts in their literary and historical context. Taught in Italian. Prereq., ITAL 2130 (min. grade C-) or instructor consent required.

**ITAL 4010-3. Problems in Translation, Advanced Grammar, and Stylistics 1.**

Emphasizes practice in translating varying types of prose from Italian into English and English into Italian. Prereq., ITAL 2130 or 3010 (min. grade C-).

**ITAL 4030-3. Contemporary Italian Culture, Politics, and the Media.** Serves as an introduction to the study of the effect that politics and the media have in shaping Italian culture. Makes use of the World Wide Web for instruction.

Taught in Italian. Familiarity with Internet helpful. Prereq., ITAL 2130 or 3010 (min. grade C-) or instructor consent.

**ITAL 4040-3. Business Italian Style.** Provides an introduction to the Italian way of conducting business, with a close view on the company and its world through learning marketing and producing a real company project for the market. Analyzes topics of international marketing and trade using Italian and American economics websites. Focuses on building cross-cultural bridges between the U.S. and Italy to have smoother business relationships and enable students to participate more easily in joint international working teams. Prereq., ITAL 3010 (min. grade C-) or instructor consent required.

**ITAL 4140-3. The Age of Dante: Readings from *The Divine Comedy*.** Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English. Prereq., junior standing or instructor consent. Same as HUMN 4140. Approved for arts and sciences core curriculum: literature and the arts.

**ITAL 4150-3. *The Decameron* and the Age of Realism.** Analyzes the rise of realism in the 13th and 14th century Italian literature and parallel manifestations in the visual arts. Focuses on Boccaccio's *Decameron* and contemporary realistic prose and poetry with emphasis on gender issues and medieval cultural diversity. Taught in English. Prereq., junior standing or instructor consent. Same as HUMN 4150. Approved for arts and sciences core curriculum: human diversity or literature and the arts.

**ITAL 4160 (3-5). Italian Literature Special Topics.** Topics vary each semester. Consult the online Schedule Planner for specific topics. May be repeated up to 8 total credit hours for different topics.

**ITAL 4170-3. Italian Literature Special Topics.** Topics vary each semester. Consult the online Schedule Planner for specific topics. May be repeated up to 6 total credit hours on different topics.

**ITAL 4200-3. Topics in Italian Culture and Civilization from the Origins through the Renaissance.** Taught in English. Topics vary. May be repeated up to 6 total credit hours on different topics.

**ITAL 4250-3. History of Italy.** Survey of political, social, and intellectual history of Italy and its people. Taught in English. Same as HIST 4313.

**ITAL 4280-3. Topics in Italian Cinema.** Examines different aspects of Italian cinema from the origins of neorealism to the present. May focus on a particular director, the culture of a specific period, or certain themes (e.g., the representation of women, the relationship between cinema and literature, or socio-aesthetic movements like Futurism or Fascism). Taught in English. May be repeated up to 6 total credit hours on different topics.

**ITAL 4290-3. Italian Culture Through Cinema.** Examines the representations of Italian culture through its Cinema. Focusing especially on post-World War II cinema, we will examine how Italian filmmakers have portrayed Italian history and specific aspects of its culture (i.e., Fascism, post-war reconstruction, the Mafia, patriarchy) in the past fifty years. Approved for arts and sciences core curriculum: contemporary societies. Taught in English.

**ITAL 4600-3. Once Upon a Time in Italy.** Examines the evolution of the Italian fairy tale from the 1500s to the 2000s in literature, theater, and film. Considers the tales and their authors in their social-historical context. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: literature and the arts.

**ITAL 4730-3. Italian Feminisms: Culture, Theory, and Narratives of Difference.** Studies Italian women writers, artists, and filmmakers. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors. Same as HUMN 4730. Approved for arts and sciences core curriculum: human diversity.

**ITAL 4840 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**ITAL 4930 (1-3). Languages Internship for Professions.** Offers opportunities to use Italian skills in service to various sectors of the community, including private industry, government, and education. Prereq., ITAL 2120 (min. grade C-) or instructor consent.

**ITAL 4980-3. Italian Senior Honors Thesis.** The senior honors thesis is a 40 to 45 page original research paper, written in Italian, and constitutes a require-

ment for graduating with departmental honors. Prereqs., all third-year course requirements including FREN 3200. Recommended prereq., at least one course numbered ITAL 4000 or above.

**ITAL 4990-3. Senior Seminar.** Preparation of a 15-page research paper in Italian presented to two members of the faculty and defended orally in class. Prereq., advisor consent. Recommended prereq., at least one course numbered ITAL 4000 or above.

## Geography

**GEOG 3840 (1-6). Undergraduate Independent Study.** Provides an independent study opportunity, by special arrangement with faculty, for students presenting strong geography preparation. May be repeated up to 8 total credit hours. Restricted to geography majors.

**GEOG 3930-3. Internship.** Provides an academically supervised opportunity for advanced geography or environmental conservation majors to work in public and private organizations on projects related to the student's career goals and to relate classroom theory to practice. May be repeated up to 6 total credit hours. Restricted to geography and environmental studies majors.

**GEOG 4100 (1-3). Special Topics in Geography.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also GEOG 4110 and 4120. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**GEOG 4110 (1-3). Special Topics in Geography.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also GEOG 4100 and 4120. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**GEOG 4120 (1-3). Special Topics in Geography.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also GEOG 4100 and 4110. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**GEOG 4430-3. Seminar: Conservation Trends.** Provides environmental studies or geography majors with an undergraduate format for interdisciplinary discussion and research into current and future directions of conservation. May be repeated up to 6 total credit hours. Restricted to junior and senior geography and environmental studies majors.

**GEOG 4990-3. Senior Thesis.** Offers thesis research under faculty supervision. May be repeated up to 6 total credit hours. Prereq., senior standing as geography or environmental studies major.

**GEOG 5100 (1-4). Special Topics: Geography.** Covers various topics outside of the normal curriculum; offered intermittently depending on student demand and availability of faculty. May be repeated up to 9 total credit hours.

**GEOG 5840 (1-3). Graduate Independent Study.** Offers independent research for master's students only. May be repeated up to 6 total credit hours. Restricted to graduate students.

**GEOG 5930-3. Advanced Internship.** Provides an academically supervised opportunity for graduate-level geography majors to work in public and private organizations on advanced projects related to geographic theory and their career goals. May be repeated up to 7 total credit hours. Restricted to graduate students.

**GEOG 6160-3. Professional and Career Development Issues.** Focuses on issues important in the first years of a faculty career including good practice in designing and using learning materials; understanding the job-search and hiring process; formulating a professional development plan; creating teaching portfolios; understanding the role of ethics and values in teaching and research; and managing time and stress. May be repeated up to 6 total credit hours. Restricted to graduate students.

**GEOG 6180 (1-3). Seminar: Geographic Problems.** Applies research methods to selected problems. Topics vary with instructor. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6940 (1-6). Master's Degree Candidate.**

**GEOG 6950 (1-6). Master's Thesis.**

**GEOG 7840 (1-3). Graduate Independent Study.** Offers independent research for doctoral students only. Restricted to graduate students. May be repeated up to 6 total credit hours.

**GEOG 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Physical Geography

**GEOG 1001-4. Environmental Systems 1: Climate and Vegetation.** Lect. and lab. Introduces the atmospheric environment of the Earth: elements and controls of climate and their implications for hydrology, vegetation, and soils. Emphasizes distribution of physical features across the Earth's surface and interactions between humans and their environment, especially those leading to global change on the decade to century time scale. Meets MAPS requirement for natural science: nonlab or lab. Approved for arts and sciences core curriculum: natural science.

**GEOG 1011-4. Environmental Systems 2: Landscapes and Water.** Lect. and lab. Introduces landscapes and flowing water, emphasizing the formation and geographic distribution of mountains, volcanoes, valleys, and deserts, and their shaping by rivers and glaciers. Includes field trips. Meets MAPS requirement for natural science: nonlab or lab. Approved for arts and sciences core curriculum: natural science.

**GEOG 3251-3. Mountain Geography.** Surveys mountain environments and their human use with illustrations from temperate and tropical mountain areas.

**GEOG 3301-3. Analysis of Climate and Weather Observations.** Prereqs., ATOC 1050 and 1060, or GEOG 3601/ATOC 3600/ ENVS 3600, OR GEOG 1001 and 1-semester calculus. Same as ATOC 3300. Approved for arts and sciences core curriculum: natural science.

**GEOG 3351-3. Biogeography.** Surveys and analyzes plant and animal distributions on a world scale from ecological and historical perspectives. Emphasizes human impact on species. Prereq., GEOG 1001.

**GEOG 3511-4. Introduction to Hydrology.** Examines hydrologic processes in the surface environment, emphasizing the environment of the western United States. Emphasizes natural processes and their management to augment water resources. Prereq., GEOG 1001 and 1011. Restricted to junior and senior geography and environmental studies majors. Approved for arts and sciences core curriculum: natural science.

**GEOG 3601-3. Principles of Climate.** Describes the basic components of the climate system: the atmosphere, ocean, cryosphere, and lithosphere. Investigates the basic physical processes that determine climate and link the components of the climate system, including the hydrological cycle and its role in climate, climate stability, and global change. Covers forecasting climate, its applications, and human dimensions. Prereqs., ATOC 1050 and 1060, or GEOG 3301/ATOC 3300, or GEOG 1001 and 1-semester calculus. Same as ATOC/ ENVS 3600. Approved for arts and sciences core curriculum: natural science.

**GEOG 4201-3. Biometeorology.** Interdisciplinary science, studying the interactions between atmospheric processes and living organisms (plants, animals, and humans). Discusses how organisms adapt to a changing environment. Uses a practical, problem-solving approach to explore these interactions. Prereq., GEOG 1001. Same as ENVS 4201.

**GEOG 4211-3. Physical Climatology: Principles.** Introduces physical principles of flows of heat and moisture to and from the Earth's surface, interaction and modeling of such flows, and their distribution in space and time. Prereq., GEOG 1001.

**GEOG 4231-4. Physical Climatology/Field Methods.** Highlights theory and field measurements in boundary layer climatology, emphasizing radioactive and turbulent fluxes near the ground. Field calibration of flux equipment and measurements of radioactive, sensible, latent, and ground heat fluxes over different terrain types. Prereqs., GEOG 1001 and 4211. Same as GEOG 5231.

**GEOG 4241-4. Principles of Geomorphology.** Studies weathering, mass-wasting, fluvial, wind, and marine processes and the resulting landforms. Prereq., GEOG 1011 or any 1000-level sequence in geological sciences. Restricted to

junior/senior GEOG/GEOL/ENVS majors. Same as GEOL 4241. Approved for arts and sciences core curriculum: natural science.

**GEOG 4251-4. Fluvial Geomorphology.** Emphasizes landscapes formed by running water. Includes basic fluid mechanics, sediment transport, hillslope and channel erosion, and sediment yield. Prereqs., GEOG 1011 and 3511. Recommended prereq., GEOG 3023. Same as GEOG 5251.

**GEOG 4261-3. Glaciers and Permafrost.** Surveys the major terrestrial components of the cryosphere, including permafrost, glaciers, and ice sheets. Emphasizes physical processes involving ice, including thermal behavior, ice deformation, and mass balance, but also considers biogeochemical processes and landforms associated with ice. The climate context, including human interactions and recent climate history, will be considered. The course will be taught in a combination lecture-seminar format. Prereq., GEOG 1011 or GEOL 1010. Recommended prereq., GEOG 4241.

**GEOG 4271-3. The Arctic Climate System.** Understanding the climate of the Arctic requires a synthetic, system oriented approach. The course focuses on the intimate linkages between the atmosphere, ocean and land that give the Arctic region its unique character, link the Arctic to the larger global climate system, and promote understanding the rapid changes occurring in the Arctic. Prereq., GEOG 1001. Same as GEOG 5271.

**GEOG 4291 (3-4). Mountain Geomorphology.** Provides a field course emphasizing the study of landforms produced by weathering and soils, mass movement, and erosional processes under all climatic and altitudinal conditions. Call for schedule of offerings. May be offered during the summer at the Mountain Research Station. Prereqs., a college course in physical geology or geography and instructor consent. Same as GEOG 5291.

**GEOG 4311-3. Watershed Biogeochemistry.** Emphasizes terrestrial-aquatic linkages in headwater catchments, focusing on hydrologic pathways, isotopic and geochemical tracers, nutrient cycling, water quality, experimental manipulations, and modeling. Prereq., GEOG 1011 and 3511. Recommended prereq., parametric statistics.

**GEOG 4321 (3-4). Snow Hydrology.** Offers a multidisciplinary and quantitative analysis of physico-chemical processes that operate in seasonally snow-covered areas, from the micro- to global-scale: snow accumulation, metamorphism, ablation, chemical properties, biological aspects, electromagnetic properties, remote sensing, GIS, and quantitative methods. Prereqs., GEOG 1001 or 1011, and any statistics course. Same as GEOG 5321.

**GEOG 4331 (3-4). Mountain Climatology.** Surveys and analyzes climatic characteristics of mountain environments worldwide. Prereq., GEOG 1001 or ATOC 1050 or 1060. Same as GEOG 5331.

**GEOG 4371-3. Forest Geography: Principles and Dynamics.** Surveys principles of forest geography and ecology. Includes both individual tree responses to environmental factors and species interactions within communities. Emphasizes forest dynamics and their relation to management problems. Prereq., GEOG 1001. Same as GEOG 5371.

**GEOG 4401-3. Soils Geography.** Discusses chemical and physical properties of soils, soil development, distributions, and management relevant to understanding plant-soil relationships in natural and human-altered landscapes. Prereq., GEOG 1011. Recommended prereq., inorganic chemistry. Same as GEOG 5401.

**GEOG 4411-3. Methods of Soil Analysis.** Applies methods of soil sampling and laboratory analysis toward an understanding of the relationships between soils, the environment, and landscape impacts. Field trips explore field observation and sampling techniques. Laboratory analyses determine soil physical and chemical properties. Prereq., GEOG 1001 or 1011; prereq./coreq., GEOG 4401/5401. Same as GEOG 5411.

**GEOG 4501-3. Water Resources and Water Management of Western United States.** Interprets and analyzes hydroclimatic data, surface, and groundwater. Critically evaluates water use, emphasizing problems associated with geographic maldistribution, appropriations, irrigation, industry, pollution, and regional development. Same as GEOG 5501.

**GEOG 5161-3. Research Design in Geography.** The human section reads and discusses contemporary research philosophies and methodologies in human geography. Practices the development of research proposals and presenta-

tion of research ideas and results. The physical section reads and discusses contemporary research philosophies and methodologies in physical geography (climatology, geomorphology, biogeography, and soils geography). Practices the development of research proposals and presentation of research ideas. Restricted to geography graduate students.

**GEOG 5211-3. Seminar: Physical Climatology.** Involves a research seminar concerned with problems of mass and energy exchange in the Earth-atmosphere system. Selects topics from such areas as air quality, bioclimatology, hydrology, climate change, and the climates of urban, agricultural, and natural environments. Restricted to graduate students.

**GEOG 5221-3. Synoptic and Dynamic Climatology.** Examines global climates from the standpoint of synoptic and dynamic climatology. Prereqs., GEOG 3201 or equivalent, 3000-level course in climate/atmospheric sciences, and instructor consent. Restricted to graduate students.

**GEOG 5231-4. Physical Climatology/Field Methods.** Prereq., GEOG 5211. Restricted to graduate students. Same as GEOG 4231.

**GEOG 5241 (1-3). Topics in Physical Geography.** Presents recent research topics that vary from year to year. Consult the online Schedule Planner for specific topics. May be repeated up to 6 total credit hours. Restricted to graduate students.

**GEOG 5251-4. Fluvial Geomorphology.** Restricted to graduate students. Same as GEOG 4251.

**GEOG 5271-3. The Arctic Climate System.** Same as GEOG 4271.

**GEOG 5291 (3-4). Mountain Geomorphology.** Same as GEOG 4291.

**GEOG 5321 (3-4). Snow Hydrology.** Restricted to graduate students. Same as GEOG 4321.

**GEOG 5331 (3-4). Mountain Climatology.** Restricted to graduate students. Same as GEOG 4331.

**GEOG 5371-3. Forest Geography: Principles and Dynamics.** Restricted to graduate students. Same as GEOG 4371.

**GEOG 5391-3. Seminar: Biogeography.** Considers in detail current research themes in biogeography. Includes intensive reading of current research literature and preparation of research papers. Restricted to graduate students. Topics vary; may be taken twice.

**GEOG 5401-3. Soils Geography.** Restricted to graduate students. Same as GEOG 4401.

**GEOG 5411-3. Methods of Soil Analysis.** Restricted to graduate students. Same as GEOG 4411.

**GEOG 5501-3. Water Resources and Water Management of Western United States.** Restricted to graduate students. Same as GEOG 4501.

**GEOG 5961-3. Theories of Climate and Climate Variability.** Critically reviews current theories of climatic variability based on analysis of the different physical processes affecting climate. Restricted to graduate students. Same as ATOC 5960.

**GEOG 6181 (1-4). Special Topics.** Highlights current problems in geography, particularly physical and environmental geography. Topics vary with instructor. Restricted to graduate students. May be repeated up to 6 total credit hours.

**GEOG 6211 (1-3). Readings in Climatology.** Discusses selected topics in current climatological literature. Specific themes vary. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6241 (1-3). Seminar in Hydrology and Geomorphology.** Emphasizes process-oriented research in hydrology and geomorphology. Sample topics include river mechanics, snow hydrology, and periglacial processes. Consult the online Schedule Planner for specific topics. May be repeated up to 6 total credit hours. Restricted to graduate students. Same as GEOL 6241.

## Human and Cultural Geography

**GEOG 1982-3. World Regional Geography.** Involves an intellectual journey around the globe, stopping at major regions to study the people, their environments, and how they interact. Topics include the political/economic tensions in changing Europe, conflicts in Brazilian rain forests, transitions facing Afri-

can peoples, and rapid changes in China. Meets MAPS requirement for social science: geography.

**GEOG 1992-3. Human Geographies.** Examines social, political, economic, and cultural processes creating the geographical worlds in which we live, and how these spatial relationships shape our everyday lives. Studies urban growth, geopolitics, agricultural development and change, economic growth and decline, population dynamics, and migration exploring both how these processes work at global scale as well as shape geographies of particular places. Meets MAPS requirement for social science: geography.

**GEOG 2002-3. Geographies of Global Change.** Familiarizes students with spatial and ecological perspectives on economic, political, social, cultural, and environmental changes. Examines roles of transnational corporations, global media, world cities, food security, labor, migration, human rights, ethnicity, nationalism, resources, environmental degradation, and sustainable development in global change. Meets MAPS requirement for social science: geography.

**GEOG 2412-3. Environment and Culture.** Examines nature-culture interactions and the effects of development and resource use on environmental quality, as well as practical efforts to manage and protect the environment. Meets MAPS requirement for social science: geography.

**GEOG 3402-3. Natural Hazards.** Explores the impacts of extreme geophysical events on human society. Emphasizes adaptations to extreme events and ways of reducing vulnerability and damage.

**GEOG 3412-3. Conservation Practice and Resource Management.** Studies inventory, policy, and management of natural resources. Emphasizes practical approaches to the conservation and management of soil, land, water, and air resources. Restricted to geography and environmental studies majors.

**GEOG 3422-3. Conservation Thought.** Lect. and rec. Provides an historical survey of human consumption of earthly materials; environmental and global considerations of population growth, cultural attitude, and technological development; and diverse goals and philosophy of conservation movements in time and place.

**GEOG 3612-3. Geography of American Cities.** Introduces geography of American cities. Includes demographic and ideological contexts of urban development, emergence of the city system, location theory and rent models, and urban-economic problems.

**GEOG 3662-3. Economic Geography.** Presents several theories of location of economic activity: general theory of land use, agricultural location theory, plant location theory, central place theory, location of systems of cities, and geographical organization of industries. Studies aggregate geographical structure of regions as the geography of three major markets: labor, product, and capital, including the banking system. Explores the economic growth of regions and policies designed to influence regional growth and welfare.

**GEOG 3672-3. Gender and the Global Economy.** Examines the role of gender in global economy. Explores the impacts of colonialism and modern global economy on gender relations, with particular emphasis on third world societies. Also focuses on related issues of population politics, environmental crisis, women's sexual exploitation, and women's social movements worldwide. Prereqs., GEOG 1982, 1992, 2002, 2412, WMST 2000 or 2050. Same as WMST 3672. Approved for arts and sciences core curriculum: human diversity.

**GEOG 3682-3. Geography of International Development.** Compares and contrasts global characteristics and processes of development, emphasizing the developing countries of the world. Integrates theories of development, specific development topics, and case studies to explore the problems of development. Recommended prereqs., GEOG 1982, 1992, 2002 or 2412.

**GEOG 3742-3. Place, Power, and Contemporary Culture.** Presents a radical re-examination of the geography of culture. Examines the relationship between places, power, and the dynamics of culture. Explores how the globalization of economics, politics, and culture shapes local cultural change. Looks at how place-based cultural politics both assist and resist processes of globalization. Recommended prereq., GEOG 1982, 1992, or 2002. Approved for arts and sciences core curriculum: contemporary societies.

**GEOG 3812-3. Mexico, Central America, and the Caribbean.** Introduces the geography of Latin America, focusing on the lands and peoples of Mexico, Central America, and the Caribbean. Examines regional and national culture,

history, environment, and population, as well as ongoing environmental and socioeconomic changes. Recommended prereqs., GEOG 1982, 1992, 2002, or 2412.

**GEOG 3822-3. Geography of China.** Surveys the world's most populous country, examining physical and historical geography, urbanization and regional development, agriculture, population, energy, and the environment. Seeks to situate China's development in a broader Asian and global context. Recommended prereqs., GEOG 1982, 1992, 2002 or 2412. Approved for arts and sciences core curriculum: human diversity.

**GEOG 3862-3. Geography of Africa.** Studies physical and cultural regions of Africa. Analyzes and compares natural and cultural regions and the development of present nation-states. Recommended prereqs., GEOG 1982, 1992, 2002 or 2412.

**GEOG 4292-3. Migration, Immigrant Adaptation, and Development.** Examines historical and current patterns of migration with an emphasis in international movement. Looks at leading migration theories related to both origin- and destination-based explanations while critically looking at the role of development as a potential cause and consequence of population movement. Finally, covers some aspects of immigrants' social and economic adaptation to their host society. Recommended prereqs., GEOG 1982, 1992, 2002, or 2412. Same as GEOG 5292 and ECON 4292.

**GEOG 4622-3. City Life.** Analyzes social, behavioral, political, and demographic factors that influence development and maintenance of communities in contemporary urban environments, with primary emphasis on U.S. cities. Recommended prereqs., GEOG 1982, 1992, 2002, or 2412. Same as GEOG 5622.

**GEOG 4712-3. Political Geography.** Systematic study of relations between geography and politics, especially as background for better understanding of international affairs. Includes topics such as frontiers and boundaries, power analysis, geopolitics, international political economy, and strategic concepts. Recommended prereqs., GEOG 1982, 1992, 2002, 2412, IAFS 1000, PSCI 2012 or 2223. Restricted to GEOG, IAFS, ENVS, junior/senior majors. Same as GEOG 5712.

**GEOG 4722-3. Field Methods in Human Geography.** Examines research methods associated with field work in human geography. Prepares students for fieldwork by focusing on geographic and interdisciplinary field work techniques; interpretation of field data; and discussion of the politics, ethics and gender, race, class, and cross-cultural issues related to field work. Prereqs., 15 credit hours in human geography. Same as GEOG 5722.

**GEOG 4732-3. Population Geography.** Emphasizes spatial aspects of population characteristics including fertility, mortality, migration, distribution, and composition. Includes both theoretical and empirical considerations, in addition to field work and computer simulations. Recommended prereqs., GEOG 1982, 1992, 2002 or 2412. Same as Geog 5732.

**GEOG 4742-3. Environments and Peoples.** Studies the interaction of people and the environment, including human adaptation and modification of environments, cultural interpretation and construction of landscapes, and natural resources and land management. May be taken twice. Topics vary. Recommended prereqs., GEOG 1982, 1992, 2002 or 2412. Restricted to juniors/seniors.

**GEOG 4812-3. Environment and Development in South America.** Presents theoretical approaches to the links between environment and development in Latin America and focuses on analytical discussion of contemporary (and controversial) issues in sustainable development in South America. Examines social, ecological, economic, and political forces influencing the use of natural resources. Recommended prereqs., GEOG 1982, 1992, 2002, 3812, 3422, ANTH 3110, or PSCI 3032.

**GEOG 4822-3. Environment and Development in China.** Examines key environmental problems in relation to China's rapid modernization and development. Recommended prereqs., GEOG 1982, 1992, 2002 or HIST 1608.

**GEOG 4832-3. Geography of Tibet.** Rigorously examines contemporary Tibetan society, culture, and nature from a geographical perspective. Uses readings on contemporary Tibet as an entry point into scholarly research about nationalism, representation, diaspora, landscape and place, sustainable development, natural resource management, identity, and environmentalism. Prereqs., GEOG 3822 or other classes on China. Same as GEOG 5832.

**GEOG 4892-3. Geography of Western Europe.** Provides a regional survey of cultural, political, economic, social, and physical geography of Western Europe, emphasizing the distinctive character and problems of each major area and the relationship of the region to the world. Recommended prereqs., GEOG 1982, 1992, 2002 or 2412.

**GEOG 5152-3. History and Theory of Geography.** History of ideas and institutions that have shaped contemporary geographic inquiry. Examines the evolving relations among human geography, physical geography, environment-society relations, and geographic information processing. Designed to situate graduate student research within major subfields and intellectual currents of geography. Restricted to graduate students.

**GEOG 5292-3. Migration, Immigrant Adaptation, and Development.** Restricted to graduate students. Same as GEOG 4292 and ECON 4292.

**GEOG 5332-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as PSCI 7333, SOCY 6031, and ECON 8333.

**GEOG 5622-3. City Life.** Restricted to graduate students. Same as GEOG 4622.

**GEOG 5642-3. Seminar: Urban Geography.** Restricted to graduate students. Surveys current research topics in urban geography. Emphasizes definition of possible student thesis topics.

**GEOG 5712-3. Political Geography.** Restricted to graduate students. Same as GEOG 4712.

**GEOG 5722-3. Field Methods in Human Geography.** Restricted to graduate students. Same as GEOG 4722.

**GEOG 5732-3. Population Geography.** Restricted to graduate students. Same as GEOG 4732.

**GEOG 5762-3. Sustainable Development: Theory and Classic Issues.** Provides an assessment of sustainable development primarily as it relates to the Third World. Follows a sequence from development theory through facts, approaches, and goals. Investigates specific topical problems and closes with analyses of case studies. Restricted to graduate students.

**GEOG 5772-3. Sustainable Development: Institutions and Policy.** Investigates the links between social theory, development practice, and policy. Restricted to graduate students.

**GEOG 5782-3. Sustainable Development: Critique.** Investigates historical and contemporary theories and critiques of development and their implications for geographic theory and method. Focuses on the role of representation in evaluating case studies and examining the potential for a sustainable development. Prereq., graduate standing. Recommended prereq., GEOG 5762.

**GEOG 5832-3. Geography of Tibet.** Same as GEOG 4832.

**GEOG 6402-3. Seminar: Comparative Environmental Studies.** Critically examines cross-cultural experience with adjustments to natural hazards and political management of resource exploitation. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6712-3. Seminar: Political Geography.** Considers in detail history and methodology of the field, including an analysis of selected systematic topics such as frontiers and boundaries, international rivers, conflicting claims to territory, and electoral geography. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6732-3. Formal Population Geography: Analysis and Forecasting.** An in-depth introduction to formal Demography. In addition to learning the basic demographic tools used nowadays in fertility, marriage, mortality, migration, and forecasting/projections, it also looks at some potential links between formal and statistical demographic work that would enable the student to apply some of the methods learnt in an econometric or multivariate setting. Prereqs., GEOG 4023/5023 or equivalent. Restricted to graduate students.

**GEOG 6742-3. Seminar: Cultural Geography.** Explores various geographic topics emphasizing the concept of culture. Emergence of several points of view in the development of cultural geography. Restricted to graduate students. May be repeated up to 7 total credit hours.

**GEOG 6752-3. Space, Place, and Gender.** Examines current research literature on gender, feminism, and geography. Begins with discussion of feminist geographic theory and then considers several empirical topics, including geographies of difference, spaces of publicity and privacy, scale, globalization, race, sexuality, labor, and migration. Restricted to graduate students.

## Techniques (Skills)

**GEOG 2043-3. Special Topics in Geography.** Covers various topics not normally covered in the curriculum. May be repeated up to 6 total credit hours within a term.

**GEOG 2053-4. Mapping a Changing World.** Overviews the vital role cartography plays in modern society and contemporary science. Includes fundamentals of reading and creating maps for research and enjoyment. Lab provides hands-on experience with computer-based methods for creating useful maps.

**GEOG 3023-4. Statistics for Earth Sciences.** Introduces parametric and distribution-free statistics, emphasizing applications to earth science problems. Not open to students who have taken a college-level statistics course. Restricted to junior and senior geography, geology, and environmental studies majors. Same as GEOL 3023.

**GEOG 3053-4. Cartography: Visualization and Information Design.** Introduction to the fundamentals of cartography—the science and art of map design. Emphasis on map projections, symbolization, and the design of maps with computers. Students produce series of thematic maps with modern computer-assisted techniques. Basic familiarity with computers strongly recommended. Restricted to junior or senior GEOG/ENVS majors.

**GEOG 4023-3. Introduction to Quantitative Methods in Human Geography.** Introduces fundamental statistical and quantitative modeling techniques widely used in geography today. Emphasizes geographic examples and spatial problems, as are statistical routines now available on most computers. Prereq., GEOG 3023 or equivalent. Same as GEOG 5023.

**GEOG 4033-2. Quantitative Methods in Geography Laboratory.** Introduces the use of personal computers and statistical software in geographical analysis. Coreq., GEOG 4023. Same as GEOG 5033.

**GEOG 4043-4. Cartography 2: Interactive and Multimedia Mapping.** An advanced course in interactive, multimedia, animated, and Web-based cartography stressing the important role digital cartography plays in cyberspace. Focuses on principles of effective cartographic design in multimedia and hypertext environments. Labs are organized around hands-on active learning projects. Prereq., GEOG 3053. Same as GEOG 5043.

**GEOG 4083-4. Mapping from Remotely Sensed Imagery.** Acquaints students with mapping of spatial information from remotely sensed imagery, specifically high spatial resolution imagery (e.g., photography) in digital form. Emphasizes correction of 2- and 3-D geometric distortions, topographic influences, planimetric, topographic, and thematic mapping concepts. Prereqs., GEOG 3093, 4093, or equivalent. Restricted to junior and senior geography and environmental studies majors. Same as GEOG 5083.

**GEOG 4093-4. Remote Sensing of the Environment.** Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum. Same as GEOG 5093 and GEOL 4093.

**GEOG 4103-4. Introduction to Geographic Information Science.** Examines construction and use of an information system and its data specifically designed for representing and manipulating geographical data. Emphasizes modern geographical information systems including computer hardware/software with a collection of methods/procedures for recording, transforming, storing/retrieving, analyzing, and mapping geographic data. Prereq., GEOG 2053 or GEOG 3053. Restricted to junior and senior geography and environmental studies majors. Same as GEOG 5103.

**GEOG 4173-3. Research Seminar.** Examines the nature of research and develops pregraduate skills for geographic research, emphasizing problem definition, methods, sources, data interpretation, and writing. Restricted to senior geography and environmental studies majors. Recommended for students pursuing honors.

**GEOG 4203-4. Geographic Information Science: Modeling Applications.**

Extends basic GIS concepts and mechanics. Develop GIS models for human and environmental applications. Grid and vector data models, tessellated and hierarchical data structures, terrain representation, interpolation and kriging, spatial regression. Small group projects design, implement and run GIS models. Prereq., GEOG 4103/5103 or instructor consent. Recommended prereq., working knowledge of GIS software. Same as GEOG 5203.

**GEOG 4303-4. GIS Programming for Spatial Analysis.** Focuses on the extension of geographic information systems (GIS) through programming as well as on the development of algorithms for spatial analysis and information extraction in vector and raster data. Covers concepts, principles and techniques of programming and solving spatial problems in physical and human Geography. Prereq., GEOG 4103/5103. Recommended prereq., GEOG 4203/5203. Same as GEOG 5303.

**GEOG 4383-3. Methods of Vegetation Analysis.** Techniques of describing, sampling, classifying, and analyzing change in vegetation applied to a variety of local vegetation types. Involves field trips and laboratory work. Prereq. or coreq., GEOG 4371. Same as GEOG 5383.

**GEOG 4983 (1-3). Field Problems.** Selected geographic problems investigated through intensive, instructor-directed field work. The instructor and the problem(s) vary and are announced. May be repeated up to 12 total credit hours. Restricted to junior/senior geography majors. Same as GEOG 5983.

**GEOG 5003-4. Elements of Geographic Information Systems.** Discusses incorporating GIS methods into graduate thesis or dissertation research. Reviews basic mapping concepts (scale and projections), acquiring different types of spatial data (raster and vector), building an error-free database, making simple queries, overlays, charts, and maps. Intended for students who want to learn GIS but lack background skills in computing or cartography. Recommended prereq., some experience with Mac or Windows. Restricted to graduate students.

**GEOG 5023-3. Introduction to Quantitative Methods in Geography.** Restricted to graduate students. Same as GEOG 4023.

**GEOG 5033-2. Quantitative Methods in Geography Laboratory.** Restricted to graduate students. Same as GEOG 4033.

**GEOG 5043-4. Cartography 2: Interactive and Multimedia Mapping.** Restricted to graduate students. Same as GEOG 4043.

**GEOG 5083-4. Mapping from Remotely Sensed Imagery.** Restricted to graduate students. Same as GEOG 4083.

**GEOG 5093-4. Remote Sensing of the Environment.** Restricted to graduate students. Same as GEOG 4093 and GEOL 5093.

**GEOG 5103-4. Geographic Information Systems.** Prereq., instructor consent. Restricted to graduate students. Same as GEOG 4103.

**GEOG 5113-3. Seminar: Geographic Information Systems.** Focuses on the current research topics in geographical information systems and selected areas of application. Includes major journal articles related to each topic. Students complete and present a seminar paper. Prereq., GEOG 4103, 5103, or instructor consent. Restricted to graduate students.

**GEOG 5183-3. Data Processing in the Earth Sciences.** Restricted to geography graduate students. Same as GEOL 5183.

**GEOG 5203-4. Geographic Information Science: Modeling Applications.** Prereq., GEOG 4103/5103 or instructor consent. Restricted to graduate students. Recommended prereq., working knowledge of GIS software. Same as GEOG 4203.

**GEOG 5303-4. GIS Programming for Spatial Analysis.** Same as GEOG 4303.

**GEOG 5383-3. Methods of Vegetation Analysis.** Restricted to graduate students. Same as GEOG 4383.

**GEOG 5983 (1-3). Field Problems.** Restricted to graduate students. May be repeated up to 7 total credit hours. Same as GEOG 4983.

**GEOG 6443-2. Remote Sensing Field Methods.** Theory and practical field measurements for validation of airborne and spaceborne spectral image acquisition. Emphasizes radiative scattering properties of soil, vegetation, cryosphere, and atmosphere. Also focuses on characterization and calibration of instrumentation to measure these properties. Restricted to graduate

students. Prereqs., GEOL/GEOG 4093/5093. Recommended prereq., GEOL 5240. Same as EBIO 6440.

**Political Data**

**GEOG 5095-3. Advanced Political Data Analysis.** Provides advanced training in empirical and analytic methods of political analysis. Covers general multivariate linear (regression) model as employed in political science. Also covers a variety of dynamic approaches to empirical analysis (stochastic models, time series, and simulation). Restricted to graduate students. Prereq., instructor consent. Same as GEOG 7095 and PSCI 7095.

**GEOG 7095-3. Advanced Political Data Analysis.** Same as GEOG 5095 and PSCI 7095.

**Geological Sciences**

**GEOL 1010-3. Introduction to Geology.** Introductory geology for majors and nonmajors. Studies the Earth, its materials, its characteristics, its dynamic processes, and how it relates to people. Separate lab (GEOL 1030) is optional. Meets MAPS requirement for natural science: nonlab. Approved for arts and sciences core curriculum: natural science.

**GEOL 1020-3. Introduction to Earth History.** Examines how the Earth's interior and surface, the atmosphere and climate, the oceans, and life interact and have changed over the immensity of geologic time. For majors and nonmajors. Separate lab (GEOL 1030) is optional. Prereq., GEOL 1010. Credit not granted for this course and GEOL 1040. Approved for arts and sciences core curriculum: natural science.

**GEOL 1030-1. Introduction to Geology Laboratory 1.** Features field trips to local points of geologic interest. Studies rocks and topographic and geologic maps. Prior or current registration in 1000-level geology recommended. Meets MAPS requirements for natural science lab, if taken with GEOL 1010. Approved for arts and sciences core curriculum: natural science. Formerly GEOL 1080.

**GEOL 1040-3. Geology of Colorado.** Reviews the geologic evolution and history of Colorado. It first develops the basic concepts needed to interpret the geology, and then systematically shows how the state evolved through geologic time. The course is designed for those who enjoy understanding the beauty and splendor of the state. Prereq., GEOL 1010. Credit not granted for this course and GEOL 1020. Approved for arts and sciences core curriculum: natural science.

**GEOL 1060-3. Global Change: An Earth Science Perspective.** Focuses on evidence for planetary warming, climate change, glacier and ice-sheet melting, and sea level rise both now and in the recent past. Attempts to develop understanding of the interactions within the coupled Earth system that regulate such changes. Utilizes examples from the geological and instrumental records, and evaluates the global warming forecast. Prereq., GEOL 1010. Meets MAPS requirement for natural science: nonlab. Approved for arts and sciences core curriculum: natural science.

**GEOL 2001-4. Planet Earth.** Explores the dynamics of planet Earth with particular emphasis on the factors that make the planet habitable. Includes examination of heat balance, hydrology, geomorphology, biogeochemistry and climate history through both lecture and lab-based activities. The course is required for the Environmental Geoscience track within the Geology major and will introduce students to the major concepts in contemporary Earth system science. Prereqs., GEOL 1010 or ENV 1000 or instructor consent.

**GEOL 2100-3. Environmental Geology.** Introduces the influences of geologic processes on human lives and the changes human actions cause in geologic systems. Uses examples and case studies from Colorado and the West. Approved for the arts and sciences core curriculum: natural science.

**GEOL 2110-4. Physical Science of the Earth System.** Covers basic concepts of physics and chemistry, taught in the context of Earth and space science. Small class size and emphasis on student investigations, lab and field work, and active learning make this course particularly appropriate for future K-6 teachers. Prereq., two high school science courses (college prep level). Same as ARSC 2110. Approved for arts and sciences core curriculum: natural science.

**GEOL 2700-2. Introduction to Field Geology.** Introduces basic field techniques necessary to collect geologic data and samples, and necessary to map geologic units. Prereqs., GEOL 1010 and 1020; or GEOL 1060 and 1070; or GEOG 1001 and 1011.

**GEOL 3010-3. Introduction to Mineralogy.** Two lects. and one lab per week. Origin, occurrence, identification, classification, and uses of minerals. Applications of mineralogy to economic geology and petrology are emphasized. Prereq., CHEM 1111 and MATH 1300.

**GEOL 3020-3. Petrology.** Field relations, petrography, petrology, chemistry, and origins of igneous and metamorphic rocks are studied by means of lectures, reading, and lab and field experience. Labs include instruction in the fundamentals of optical petrography and the study of rocks in thin section. Prereq., GEOL 3010.

**GEOL 3023-4. Statistics for Earth Sciences.** Introduces parametric and distribution-free statistics, emphasizing applications to earth science problems. Same as GEOG 3023.

**GEOL 3030-3. Introduction to Hydrogeology.** Introduces groundwater flow concepts, hydrologic cycle, physical and chemical properties, flow net, hydraulic potential, geologic controls on heterogeneity and anisotropy, aquifers and aquitards in a geologic system, saturated and unsaturated flow, flow to a well, pumping tests, and role of groundwater in geologic processes. Prereqs., GEOL 1010 or 2001, and MATH 1300; or instructor consent.

**GEOL 3040-3. Global Change: The Recent Geological Record.** Geological records in lakes, oceans, deserts, and around glaciers indicate the significant changes in the global systems that have taken place over the last few hundred or thousand years. Explores the timing and nature of these changes. Prereqs., any two-course sequence of natural science core courses. Approved for arts and sciences core curriculum: natural science. Credit not granted for this course and GEOL 4070.

**GEOL 3050-2. GIS for Geologists.** Introduction to Geographic Information Systems (GIS) techniques focused on geological applications. GIS analyzing, mapping, and GPS use are covered. Basic computer skills are a plus before entering the class.

**GEOL 3070-3. Introduction to Oceanography.** Investigates the broad-scale features and dynamics of the Earth's oceans. The course is roughly divided amongst the four major, interrelated disciplines of oceanography: marine geology, marine chemistry, physical oceanography (i.e. circulation), and marine biology. Specific topics include seafloor spreading, marine sediments, salinity, biogeochemical cycles, currents, waves, tides, primary production, marine ecology, marine resources, global warming, and much more. Prereq., any two-course sequence of natural science courses. Same as ATOC 3070. Approved for arts and sciences core curriculum: natural science.

**GEOL 3120-4. Structural Geology.** Geometrical techniques for describing and illustrating geological structures. Major topics include graphic methods and geometry of fractures and folds. Prereqs., any 1000-level sequence in geological sciences.

**GEOL 3130-3. Global Warming: Understanding the Forecast.** Uses the example of man-made climate change to develop an analytical understanding of the Earth system (solid, fluid, and living) that can be used to interpret the complex and uncertain forecast. Emphasis is given to the concepts of forcing, feedback and response in order to examine natural vs. man-made environmental changes and climate change mitigation strategies.

**GEOL 3230-3. Introduction to Earth Materials.** Provides introduction to the classification, composition and properties of Earth rocks and minerals, with emphasis on near surface Earth materials. Two lectures and one lab per week. Labs include instruction on optical mineralogy and on the study of rocks in thin section. Prereqs., CHEM 1111 and MATH 1300.

**GEOL 3300-3. Extraterrestrial Life.** Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth; possibility of life elsewhere in the solar system, including Mars; and the possibility of life on planets around other stars. Prereq., one-year sequence in a natural science. Same as ASTR 3300.

**GEOL 3320-3. Introduction to Geochemistry.** Introduces chemical principles as applied to geologic processes. Includes an introductory discussion of mineral and rock chemistry, aqueous geochemistry, and organic geochemistry.

Prereqs., CHEM 1111 and MATH 1300.

**GEOL 3410-3. Paleobiology.** Surveys morphology, ecology, and evolution of ancient animal and plant life and their interactions with the Earth. Fossils used to solve geological and biological problems. Prereqs., any 1000-level sequence in geological science or environmental, population, and organismic biology or instructor consent.

**GEOL 3430-4. Sedimentology and Stratigraphy.** Introduces the study of sedimentary rocks emphasizing their origin, characteristics, and interpretation; and the principles and techniques for establishing the temporary order and spatial distribution of sedimentary layers. Prereqs., any 1000-level sequence in geological sciences or equivalent.

**GEOL 3500-3. Earth Resources and the Environment.** Examines Earth's most important natural resources and their impact on society and the environment. Addresses the geology, occurrence, production, and use of petroleum, coal, mineral, and water resources. Future world energy supply and demand, conservation, and the transition from fossil fuels to non-polluting renewable resources are discussed. Prereq., GEOL 1010 or 1060. Approved for arts and sciences core curriculum: natural science.

**GEOL 3520-3. Environmental Issues in Geosciences.** Addresses current environmental problems in which an understanding of geology is needed. Topics include energy resources, climate modification, hydrology, waste disposal, and mining resources. Specific examples used to illustrate restrictions imposed by nature and man on solutions to these problems. Prereq., a two-course sequence in any natural science. Same as ENV 3520. Approved for arts and sciences core curriculum: natural science.

**GEOL 3540-3. Introduction to Hydrocarbon Geology.** Discusses the origin and distribution of conventional and unconventional petroleum and coal resources, source rocks, types of traps and seals, reservoir rock properties, exploration and development methods (seismic data analysis and interpretation, formation evaluation, subsurface mapping), reservoir characterization and modeling, reserves calculations. Prereqs., GEOL 1010 and MATH 1300 or APPM 1350, or instructor consent.

**GEOL 3720-3. Evolution of Life: The Geological Record.** Discusses the evolution of life on Earth, beginning with the earliest origins and surveying the major steps that led to the rise of higher plants and animals. Covers modern ideas on the causes of periodic mass extinctions in both the marine and terrestrial realms. Emphasizes geologic evidence for the pathways of evolution, using examples from the ordinary to the bizarre. Approved for arts and sciences core curriculum: natural science.

**GEOL 3820-3. The Fluid Earth.** Examines the myriad forms of fluid behavior found on earth, from the atmosphere to the inner core. Explores how basic principles of fluid physics may be used to understand a broad range of earth processes, including mantle convection, atmosphere and ocean dynamics, stream flow, lava spreading, and glacier motion, among others. Covers fundamental fluid concepts such as viscosity, pressure, convection, friction, and free-surface flow. Prereqs., MATH 1300, or APPM 1340 and 1345, or APPM 1350, or equivalent. Recommended prereq., GEOL 1010 or equivalent.

**GEOL 3930 (1-6). Internship.** Offers an academically supervised opportunity for geological sciences majors to work with public or private organizations. Projects are usually associated with students' career goals; each project has an academic emphasis. Prereq., junior standing and completion, with a B or better, of at least two courses for geology majors.

**GEOL 3950-3. Natural Catastrophes and Geologic Hazards.** Surveys historic and prehistoric natural disasters, their cause, and potential for recurrence. Meteorite impact, earthquakes, volcanic eruptions, tsunamis, landslides, floods, magnetic reversals, and major extinction events. Course formerly numbered as GEOL 4950. Prereq., one year science. Approved for arts and sciences core curriculum: natural science.

**GEOL 4060-4. Oceanography.** Examines the ocean as a system influencing the Earth's surficial processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, deep sea sediments. Laboratory emphasizes the use of oceanographic data. Prereq., one semester chemistry, physics, or geology. Same as GEOL 5060.



**GEOL 4070-3. Paleoclimatology.** Covers the primary forcings and feedbacks that determine Earth's energy balance and the resultant climate system on decadal to millennial timescales. Covers ocean/atmosphere circulation, the role of ice sheets in the climate system, monsoons, Holocene climate change and 20th Century warming. Includes coverage of the proxies available to reconstruct climates of the past, and the archives that contain these proxies. Recommended for natural science majors only and recommended prereq of ENVS or GEOL intro sequence. Credit not granted for this course and GEOL 3040.

**GEOL 4080-3. Societal Problems and Earth Sciences.** Analyzes contemporary societal problems involving geoscience. One class period per week is generally devoted to lecture. During class discussions the professor acts as scientific advisor while students debate material they have researched. Prereqs., one year of calculus and one year of natural science (physics, chemistry, biology) or equivalent, or instructor consent.

**GEOL 4093-4. Remote Sensing of the Environment.** Covers acquisition and interpretation of environmental data by remote sensing. Discusses theory and sensors, as well as manual and computerized interpretation methods. Stresses infrared and microwave portions of the spectrum. Same as GEOL 5093 and GEOG 4093.

**GEOL 4130-3. Principles of Geophysics.** Students are introduced to fundamental geophysics including seismology, geomagnetism, gravity, radiometric dating, and heat flow with applications to plate tectonics and exploration of the subsurface. Prereqs., MATH 1300 and PHYS 1110 and any 1000-level sequence in geological sciences; GEOL 3120 recommended.

**GEOL 4160-3. Introduction to Biogeochemistry.** Covers fundamentals of biogeochemical cycling, emphasizing water, carbon, and nutrient dynamics in terrestrial ecosystems; chemical interactions of atmosphere, biosphere, lithosphere, and hydrosphere; and natural and human-managed environments. Prereqs., GEOL 3320 or EBIO 3270, and CHEM 1011 or higher. Same as ENVS 4160 and EBIO 4160.

**GEOL 4241-4. Principles of Geomorphology.** Studies weathering, mass-wasting, fluvial, wind, and marine processes and the resulting landforms. Prereq., GEOG 1011 or any 1000-level sequence in geological sciences. Same as GEOG 4241. Approved for arts and sciences core curriculum: natural science.

**GEOL 4270-3. Marine Chemistry and Geochemistry.** Examines the chemical, biological, geological, and physical processes affecting (and affected by) the chemistry of the oceans. Topics include: chemical separation in seawater; the marine carbon cycle and its long-term control on atmospheric CO<sub>2</sub>; the large-scale interdependence of nutrient distributions and biological productivity; chemical tracers of ocean circulation; and the chemistry of marine sediments, including early diagenesis. Prereq., general chemistry or equivalent. Recommended prereq., intro geology and/or oceanography. Restricted to juniors/seniors.

**GEOL 4330-3. Cosmochemistry.** Investigates chemical and isotopic data to understand the composition of the solar system: emphasis on the physical conditions in various objects, time scales for change, chemical and nuclear processes leading to change, observational constraints, and various models that attempt to describe the chemical state and history of cosmological objects in general and the early solar system in particular. Prereq., upper-division undergraduate or graduate standing in physical science. Recommended prereq., upper-division undergraduate CHEM, PHYS, or MATH. Same as GEOL 5330 and ASTR 4330.

**GEOL 4474-4. Vertebrate Paleontology.** Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups. Prereqs., GEOL 1010, 1020, and 3410, or instructor consent. Restricted to juniors and seniors. Same as GEOL 5474.

**GEOL 4500-3. Critical Thinking in the Earth Sciences.** Deals with controversies within the broad realm of geological sciences, including planetary geology, evolution, paleobiology, global change, environmental issues, plate tectonics, resources, other societal problems, or geologic thought in general. Students are provided the opportunity to analyze and debate scientific issues in the earth sciences. May be repeated up to 6 total credit hours. Prereq., any 1000-level geological science sequence.

**GEOL 4550-3. Petroleum Reservoir Characterization and Modeling.** Introduces concepts and methods of petroleum reservoir analysis and 3-D

reservoir modeling using subsurface data (cores, well logs, 3-D seismic) and outcrop analogs. Examines petroleum system, petrophysics (lithology, porosity, permeability, capillary pressure, flow units), and sequence-stratigraphic, facies, and structural controls on reservoir properties, heterogeneity, and recovery efficiency. Deterministic and stochastic reservoir modeling methods are addressed. Prereqs., GEOL 1010, 1020, and 3430 or instructor consent. Restricted to juniors/seniors. Same as GEOL 5550.

**GEOL 4670-3. Isotope Geology.** Introduces principles of stable and radiogenic isotope systematics in inorganic and organic geochemistry. Emphasizes application of isotope data to problems in igneous, metamorphic, and sedimentary petrology, geobiochemistry, and petroleum genesis. Prereqs., CHEM 1131, MATH 1300, and GEOL 3020. Same as GEOL 5670.

**GEOL 4700 (1-4). Special Geological Topics.** Studies in selected geological subjects of special current interest (for undergraduates). May be repeated up to 9 total credit hours within a term. Prereq., instructor consent. Restricted to juniors and seniors.

**GEOL 4711-2. Igneous and Metamorphic Field Geology.** Applies field techniques to interpretation of igneous and metamorphic rocks. Field exercises and lectures focus on collecting data required to map igneous and metamorphic rock units. Prereqs., GEOL 2700 or 2001. and GEOL 3020.

**GEOL 4712-2. Structural Field Geology.** Methods of field study of structure of rocks, including observations, data collection, and interpretation to understand geometry of deformation and causative processes and kinematics. Field projects are mapped using different scales, air photos, topographic maps, and compass and tape. Prereqs., GEOL 2700 and 3120.

**GEOL 4714-2. Field Geophysics.** Applies geophysical field techniques and data interpretation to studying geological and engineering problems. Fieldwork includes seismic, gravity, magnetic, and electrical measurements. Prereqs., GEOL 2700 or 2001 and MATH 1300 and PHYS 1110 or instructor consent.

**GEOL 4715-2. Field Techniques in Hydrogeology.** Introduces various field techniques and data analysis methods in hydrogeologic studies for students in geology, environmental studies, geography, and civil engineering. Exercises include mapping ground water levels, conducting slug and pumping tests, measuring stream flows, interpreting aquifer parameters from geophysical measurements, and using field data for water budget analysis. Prereq., GEOL 2001 or 2700.

**GEOL 4716-2. Environmental Field Geochemistry.** Develops basic field skills in the most commonly performed tasks required for the environmental characterization of solid and aqueous wastes. Media of study include soils, stream sediments, surface waters, ground waters, and atmospheric particulates. Prereqs., GEOL 2700 or 2700, and CHEM 1011/1031 or CHEM 1051/ 1071, or CHEM 1111/1131, or CHEM 1151/1171.

**GEOL 4717-2. Field Seminar in Geology and Tectonics.** Studies geologic features in and around Colorado to gain an overview of the geologic and tectonic evolution of the western U.S. Prereqs., GEOL 2700 and one or more of GEOL 3120, 3320, or 3430.

**GEOL 4750-2. Field Techniques in Hydrogeology.** Designed for students in geology, environmental studies, geography, and civil engineering, this field course introduces students to various field techniques and data analysis methods in hydrogeologic studies. Exercises include mapping ground water levels, conducting slug and pump tests, measuring stream flows, interpreting aquifer parameters from geophysical measurements, and using field data for water budget analysis. Prereqs., GEOL 2700/3030, or GEOG 3511, or GEOL/ GEOG 4241, or GEOL 3430.

**GEOL 4840-4849 (1-3). Independent Study in Geology.** Time and credit to be arranged. Numbered GEOL 4840 through GEOL 4849. For advanced undergraduates who have high scholastic standing. Open only upon consultation with department advisor. May be repeated up to 7 total credit hours.

**GEOL 4851 (1-3). Independent Study in Geoscience Education.** May be repeated up to 3 credit hours.

**GEOL 4960-1. Writing in Geosciences.** Emphasizes strategies of literature research and scientific writing in the geosciences. Includes small writing assignments and a larger library research paper. Prereq., 15 hours of upper-division course work in geological sciences.

**GEOL 4990 (1-3). Honors Thesis.** Supervised project involving original research in any area of the geological sciences. The thesis is submitted to the Honors Program of the College of Arts and Sciences and is orally defended. The candidate must have a cumulative GPA of 3.30 or better and must be accepted by the departmental honors committee.

## Graduate Courses

**GEOL 5060-4. Oceanography.** Same as GEOL 4060.

**GEOL 5070-3. Advanced Sedimentology.** Goal is to be able to more fully interpret the stratigraphic record. First half of the course studies fluid flow, sediment transport, and resultant bedforms. Second half focuses on carbonates, biological and chemical processes, and the resultant sedimentary products. Prereq., GEOL 3430.

**GEOL 5080-3. Advanced Hydrogeology and Modeling Concepts.** Introduces advanced groundwater flow and modeling concepts, equations for steady state and transient flow, saturated and unsaturated flow, finite difference method, application of modeling in geologic processes, radial flow and aquifer parameters, infiltration and groundwater recharge, model calibration, verification, and prediction. Prereqs., MATH 2300, FORTRAN, or instructor consent.

**GEOL 5093-4. Remote Sensing of the Environment.** Same as GEOL 4093 and GEOG 5093.

**GEOL 5110-3. Geomechanics.** Introduces fundamental physical processes important to the transport of heat and mass in the earth and on earth's surface. Provides practice with quantitative treatment of geological problems. Solutions for each problem are derived from first principles, including conservation and flux laws. Emphasizes heat conduction and viscous fluid flow. Prereq., calculus.

**GEOL 5183-3. Data Processing in the Earth Sciences.** Advanced statistical analysis, multivariate statistics, time series, classification models. Prereq., GEOL 3023 or instructor consent. Same as GEOG 5183.

**GEOL 5240-4. Remote Sensing Image Analysis.** Digital image processing emphasizing hands-on computer analysis of space-acquired images. Theory and practice of image enhancement and thematic information extraction. Knowledge of multivariate statistics recommended. Prereq., GEOG 4093 or 5093, GEOL 4093 or 5093.

**GEOL 5270-3. Marine Chemistry and Geochemistry.** Same as GEOL 4270.

**GEOL 5280-3. Aqueous and Environmental Geochemistry.** Explores the fundamentals of low-temperature geochemistry to investigate element speciation and chemical behavior in waters, soils and sediments. Topics include water-rock interaction and weathering, mineral dissolution and precipitation reactions, aqueous complexation, mineral surface chemistry, kinetics, element cycles, and redox biogeochemistry. Includes exposure to spectroscopic tools, computer simulations, and microbial geochemistry. Prereq., GEOL 3320 or 1 year of college chemistry or instructor consent.

**GEOL 5840-3. Global Biogeochemical Cycles.** Focuses on the cycling of elements at the global scale with a particular emphasis on human modification of biogeochemical cycles. Major biogeochemical cycles, their past dynamics, present changes, and potential future scenarios will be addressed. Ecosystem to global-scale model of the earth system will be discussed along with global scale measurements of element fluxes from satellites, aircraft, and measurement networks. Prereq., general chemistry, some organic chemistry. Same as ENV 5840.

**GEOL 5330-3. Cosmochemistry.** Same as GEOL 4330 and ASTR 5330.

**GEOL 5410-3. Ancient Sedimentary Environments.** Analysis of sedimentary rock sequences, sedimentary environments, and stratigraphic synthesis. Prereq., GEOL 3430.

**GEOL 5420-3. Quaternary Dating Methods.** In-depth survey of standard and experimental dating methods that provide absolute ages for events of the last two million years of Earth history. Includes theory and application of radiocarbon, uranium series, amino acid, thermo-luminescence, fission track, potassium/argon, hydration, light stable isotopes, and other radioactive techniques.

**GEOL 5430-3. Paleoclimatology and Paleogeography.** Examines scientific tools, data, and theories related to the dramatically varied past climate of the

Earth. Focus will be on marine records of climate change and ocean circulation, but ice core and continental archives will also be discussed. Course will cover the Cretaceous Period to the present, with particular emphasis on the past 150,000 years (the last ice age cycle). Prereq., intro geology or equivalent. Recommended prereq., intro oceanography or atmospheric science.

**GEOL 5474-4. Vertebrate Paleontology.** Same as GEOL 4474 and MUSM 5474.

**GEOL 5550-3. Petroleum Reservoir Characterization and Modeling.** Restricted to graduate students. Same as GEOL 4550.

**GEOL 5650-3. Carbonate Sedimentary Environments.** Examines recognition and interpretation of modern and ancient carbonate sedimentary environments through the analysis of fauna, texture, sedimentary structures, and primary geochemistry. Emphasizes eustatic sea level and climatic controls. Prereqs., GEOL 3410 and 3430.

**GEOL 5670-3. Isotope Geology.** Same as GEOL 4670.

**GEOL 5690-3. Tectonic History of the Western United States.** Provides students with the practical tools needed to make tectonic interpretations through study of the geologic history of the western United States and the geodynamic models used in interpreting that history. Paleomagnetism, geobarometry, geothermometry, geodynamic modeling, and elements of structural geology and stratigraphy are topics considered in this class. Prereqs., GEOL 3120 and PHYS 1110.

**GEOL 5700 (1-4). Geological Topics Seminar.** Seminar studies in geological subjects of special current interest are offered primarily for graduate students, as departmental staff and facilities permit. May be repeated up to 9 total credit hours.

**GEOL 5711 (1-3). Igneous and Metamorphic Field Geology.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5712 (1-3). Structural Field Geology.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5714 (1-3). Field Geophysics.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5715 (1-3). Field Techniques in Surficial Geology and Geohydrology.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5716 (1-3). Environmental Field Geochemistry.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5717 (1-3). Field Seminar in Geology and Tectonics.** Includes field geophysics, environmental, structural, and stratigraphic field geology, and/or field topics in petrology, hydrology, and geomorphology. May be repeated up to 6 total credit hours.

**GEOL 5800-3. Planetary Surfaces and Interiors.** Examines processes operating on the surfaces of solid planets and in their interiors. Emphasizes spacecraft observations, their interpretation, the relationship to similar processes on Earth, the relationship between planetary surfaces and interiors, and the integrated geologic histories of the terrestrial planets and satellites. Prereq., graduate standing in physical sciences or instructor consent. Same as ASTR 5800.

**GEOL 5810-3. Planetary Atmospheres.** Covers the structure, composition, and dynamics of planetary atmospheres. Includes the origin of planetary atmospheres, chemistry and cloud physics, greenhouse effects, climate, and the evolution of planetary atmospheres—past and future. Same as ATOC 5810 and ASTR 5810.

**GEOL 5820-3. Origin and Evolution of Planetary Systems.** Considers the origin and evolution of planetary systems, including protoplanetary disks, condensation in the solar nebula, composition of meteorites, planetary accretion, comets, asteroids, planetary rings, and extrasolar planets. Applies celestial

mechanics to the dynamical evolution of solar system bodies. Prereq., graduate standing in physical sciences or instructor consent. Same as ASTR 5820 and ATOC 5820.

**GEOL 5830-3. Topics in Planetary Science.** Current topics in planetary science, based on recent discoveries, spacecraft observations, or other developments. Focuses on a specific topic each time it is offered, such as Mars, Venus, Galilean satellites, exobiology, comets, or extrasolar planets. May be repeated up to 6 total credit hours, provided the topics vary. Prereq., graduate standing in physical sciences or instructor consent. Same as ATOC/ASTR 5830.

**GEOL 5835-1. Seminar in Planetary Science.** Studies current research on a topic in planetary science. Students and faculty give presentations. Subjects may vary each semester. May be repeated up to 4 total credit hours to meet candidacy requirements. Prereq., graduate standing or instructor consent. Same as ATOC 5835 and ASTR 5835.

**GEOL 5840-5851 (1-3). Graduate Independent Study.** Numbered GEOL 5840 through GEOL 5851. May be repeated up to 7 total credit hours.

**GEOL 5852 (1-3). Independent Study—GIS Applications in Quaternary Geosciences.** Leads students through quantitative spatial analysis of environmental and paleoclimatic problems. Each student will develop a project from start to finish, with emphasis on raster GIS for building large empirical databases that bear on process and variability.

**GEOL 6060-4. Petroleum Geology of Turbidite Systems.** Covers the exploration and production aspects of petroleum submarine fans and turbidite systems. A one-week field trip to Arkansas is included. Students are responsible for part of the trip expenses. Prereq., GEOL 6330.

**GEOL 6241 (1-3). Seminar in Hydrology and Geomorphology.** Emphasizes process-oriented research in hydrology and geomorphology. Sample topics include river mechanics, snow hydrology, and periglacial processes. Same as GEOG 6241. May be repeated up to 6 total credit hours.

**GEOL 6310-3. Sedimentary Petrology.** Interpretation of depositional and diagenetic history of sedimentary rocks as determined from thin-section studies. Prereqs., GEOL 3010, 3020, and 3430.

**GEOL 6330-4. Applied Sequence Stratigraphy and Basin Analysis.** Develops skills in the stratigraphic interpretation of seismic reflection data, recognition of sequence stratigraphy in well logs and outcrop, and their applications to basin analysis in petroleum exploration. Prereqs., graduate standing, introductory undergraduate physics, and sedimentology/stratigraphy.

**GEOL 6610-3. Earth and Planetary Physics 1.** Offered alternate years. Mechanics of deformable materials, with applications to earthquake processes. Introduces seismic wave theory. Inversion of seismic data for the structure, composition, and state of the interior of the Earth. Same as ASTR 6610 and PHYS 6610.

**GEOL 6620-3. Earth and Planetary Physics 2.** Offered alternate years. Space and surface geodetic techniques, as well as potential theory, are covered. Other topics are definition and geophysical interpretation of the geoid and of surface gravity anomalies; isostasy; post-glacial rebound; tides and the rotation of the Earth. Same as ASTR 6620 and PHYS 6620.

**GEOL 6630-3. Earth and Planetary Physics 3.** Offered alternate years. The solar system: theories of its origin, meteorites. Distribution of radioactive materials; age dating. Heat flow through continents and the ocean floor; internal temperature distribution in the Earth; mantle convection. Origin of the oceans and atmosphere. Same as ASTR 6630 and PHYS 6630.

**GEOL 6650 (1-3). Seminar in Geophysics.** Advanced seminar studies in geophysical subjects for graduate students. Same as ASTR 6650 and PHYS 6650. May be repeated up to 6 total credit hours.

**GEOL 6670-2. Geophysical Inverse Theory.** Principles of geophysical inverse theory as applied to problems in the Earth sciences, including topography, Earth structure, and earthquake locations. Prereqs., calculus and computer programming (any language). Same as PHYS 6670.

**GEOL 6940-3. Master's Degree Candidate.**

**GEOL 6950 (1-6). Master's Thesis.**

**GEOL 6960-3. Plan II Master's Research.**

**GEOL 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Germanic and Slavic Languages and Literatures

### German

**GRMN 1010-4. Beginning German 1.** For students with no previous training in German. Credit not granted for this course and GRMN 1030.

**GRMN 1020-4. Beginning German 2.** Prereq., GRMN 1010 (min. grade of C-). Credit not granted for this course and GRMN 1030.

**GRMN 1030-5. Intensive Beginning German.** Covers the same material as GRMN 1010 and GRMN 1020 in one course. Focuses on acquiring ability to understand and speak everyday German; on developing reading and writing skills; and on learning about the cultures of the German-speaking countries. Credit not granted for this course and GRMN 1010 and GRMN 1020.

**GRMN 1500-3. German for Reading Knowledge.** Designed especially for graduate students. Emphasizes analytical skills for acquiring reading proficiency in specialized and technical German in one's field of research. Recommended for pass/fail registration. Does not satisfy the arts and sciences foreign language requirement. Does not count towards the German major.

**GRMN 2010-4. Intermediate German 1.** Review and continuation of basic skills begun in the first year: reading, writing, speaking, and oral comprehension. Prereq., GRMN 1020 (min. grade C-). Meets MAPS requirement for foreign language. Satisfies arts and sciences language requirement. Credit not granted for this course and GRMN 2030.

**GRMN 2020-4. Intermediate German 2.** Prereq., GRMN 2010 (min. grade C-). Credit not granted for this course and GRMN 2030.

**GRMN 2030-5. Intensive Intermediate German.** Covers the same material as GRMN 2010 and GRMN 2020 in one semester. Offers review and continuation of basic skills begun in the first year: reading, writing, speaking and oral comprehension. Prereq., GRMN 1020 or GRMN 1030 (min. grade C-), or instructor consent. Credit not granted for this course and GRMN 2010 and GRMN 2020. Meets MAPS requirement for foreign language. Approved for arts and sciences core curriculum: foreign language.

**GRMN 3010-3. Advanced German 1.** Reviews special grammatical topics, reading, and conversation. Students have the option of taking the internationally recognized exam *Zertifikat Deutsch* in GRMN 3010. Prereq., four semesters of college German or equivalent. Open to freshmen with instructor consent.

**GRMN 3020-3. Advanced German 2.** Expands and refines skills acquired in GRMN 3010. Students acquire a varied, precise, and idiomatically advanced vocabulary; an understanding of different registers, from the casual to the very formal; and an ability to communicate effectively in spoken and written German in a variety of social situations, including professional life. Prereq., GRMN 3010 or instructor consent.

**GRMN 3030-3. Business German.** Introduces students to the language of German business and economic life. Provides insights into everyday business practices and institutions, including Germany's position in the European and world markets. Emphasizes acquiring basic business vocabulary and writing business letters and resumes in German. Prepares students for the exam *Deutsch fuer den Beruf*, a diploma recognized worldwide by business and industry. Prereq., GRMN 2020 or instructor consent.

**GRMN 3110-3. German Literature from the Avant-garde to the Postmodern.** Examines selected literary texts. Emphasizes longer unedited texts as well as critical skills. May be taken either before or after GRMN 3120. Prereq., GRMN 2020 or equivalent, or instructor consent.

**GRMN 3120-3. German Literature from the Enlightenment to Expressionism.** Examines selected literary texts of various periods. Emphasizes longer texts and critical skills. May be taken either before or after GRMN 3110. Prereq., GRMN 2020 or equivalent, or instructor consent.

**GRMN 3130-3. Issues in German Philosophy and Literature.** Examines selected interdisciplinary texts from the German literary and philosophical tradition. Topics address issues central to philosophical inquiry, and may include knowledge and its limits, mind and body, determinism and free will, reason and religious belief, and ethical problems. Prereqs., GRMN 2020 and 2030, or equivalent.

**GRMN 3140-3. Current Issues in German Literature.** Examines issues pervading contemporary German literature, such as concerns of youth, gender, stereotyping as it affects women and men in their relations with one another, loneliness and sexual frustration, work experiences, and other issues. Prereq., ability to read unedited German and to speak German.

**GRMN 3150-3. Issues in German Politics and Literature.** Examines literary and theoretical texts in German about the relationship between literature and politics. Topics may include history and revolution, political theater, feminist aesthetics, or terrorism. Readings and discussion in German. Prereqs., GRMN 2020 and GRMN 2030, or equivalent.

**GRMN 3520-3. Open Topics in the Cultural Context.** Examines topics in the cultures of German-speaking central Europe. Contact the departmental office for specific course offerings. May be repeated up to 6 total credit hours when topic varies. Prereq., GRMN 3020 or equivalent, or instructor consent.

**GRMN 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**GRMN 3930 (1-6). Internship.** Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments. May be repeated up to 6 total credit hours. Restricted to junior and senior GRMN majors and minors.

**GRMN 4010-3. Advanced Grammar and Stylistics.** Offers a complete final review of German grammar and syntax and its more complex aspects. Prepares students for the Goethe-Zertifikat C1. Prereq., GRMN 3020 or instructor consent.

**GRMN 4330-3. The Age of Goethe.** German literature from 1770 to 1830. Close examination of representative texts from the periods of Sturm und Drang, classicism, and romanticism. Emphasizes philosophical and social background. Prereq., GRMN 3020 or instructor consent.

**GRMN 4340-3. Seminar in German Literature.** Intensive study of a particular literary period, author, or genre. Secondary sources are used. Course content differs each time. May be repeated up to 6 total credit hours when topic varies. Prereq., GRMN 3020 or instructor consent.

**GRMN 4450-3. Methods of Teaching German.** Required of students who desire the recommendation of the department for secondary school teaching positions. For student teaching in German, see EDUC 4712 under the School of Education. Restricted to students who have been admitted to the teacher education program in the School of Education.

**GRMN 4460-6. High School German Teaching.** Part of the supervised student teaching in a secondary school required for state certification to teach German. Restricted to students who have been admitted to the teacher education program in the School of Education.

**GRMN 4550-3. Senior Seminar: The Roles of Intellectuals and Academics in German Culture.** Examines the articulation of the German bourgeoisie during critical periods in German history. Looks at specific groups and their participation in German public culture, e.g., writers, artists, journalists, academics, and political figures. Students work closely with a faculty advisor during the semester and are expected to produce a major research paper. Prereq., GRMN 3020 or instructor consent. Restricted to senior GRMN majors.

**GRMN 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

### *German Courses Taught in English*

**GRMN 1601-3. Germany Today.** Introduces the culture of contemporary German-speaking central Europe, examining historical processes, social and political patterns, and the intellectual and artistic responses to problems of

the 20th and 21st centuries. Approved for arts and sciences core curriculum: contemporary societies.

**GRMN 1602-3. Metropolis and Modernity.** An interdisciplinary introduction to the modern industrial city in Europe and the USA, with particular attention to the representation of urbanism in the visual arts. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 1701-3. Nature and Environment in German Literature and Thought.** Critically examines titles in German literature and thought. Nature and environment are used to explore alienation, artistic inspiration, nihilism, exploitation, sexuality, rural versus urban, meaning of the earth, cultural renewal, identity and gender. This "green" survey of German classics spans Romanticism's conception of nature as unconscious spirit to the politics and values of contemporary Germany's Green Party. Same as HUMN 1701. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 2301-3. Inside Nazi Germany: Politics, Culture, and Everyday Life in the Third Reich.** Examines social culture and everyday life in Nazi Germany. Topics include the role of propaganda in the media and entertainment industries, anti-Semitism and suppression of ethnic, social and religious minorities, the role of education and youth organizations, as well as the role of women, the churches, and the effects of a controlled economy before and during World War II. Approved for arts and sciences core curriculum: historical context.

**GRMN 2501-3. 20th-Century German Short Story.** Short stories by Thomas Mann, Kafka, Boell, and Grass, such as *Death in Venice*, *Metamorphosis*, and *Cat and Mouse*. Emphasizes literary themes, their traditions, and their cultural significance. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 2502-3. Representing the Holocaust.** Examines how the memory of the Holocaust in Nazi Germany is increasingly determined by the means of its representation, e.g., film, autobiography, poetry, architecture. Same as JWST 2502. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 2503-3. Fairy Tales of Germany.** Explores the origins, cultural significance, stylistic and thematic features of the German fairy tale, with emphasis on the Brothers Grimm; on artistic fairy tales by Goethe, Tieck, Brentano, and others; and on modern retellings in literature and popular culture. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 2601-3. Kafka and the Kafkaesque.** Exposes the students to a wide selection of Kafka's literary output and aims to define the meaning of the Kafkaesque, by looking not only for traces of Kafka's influence in the verbal and visual arts, but also for traces left in Kafka's own work by his precursors in the literary tradition. Taught in English. Same as HUMN 2601. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 2603-3. Moral Dilemmas in Philosophy and Literature.** Examines the moral dilemmas that arise when opportunities afforded by basic freedoms or advances in technology clash with the ethical imperatives that issue from the Enlightenment and the social contract. Guiding questions include: When does the quest for knowledge legitimate transgression of prevailing morality? By what standard do we adjudicate the ambitions of the individual when they compete with the interests of the state? Taught in English. Formerly GRMN 1603. Approved for art and sciences core curriculum: ideals and values.

**GRMN 3201-3. German and Russian Culture in Comparative Perspective.** Comparative overview of the evolution of German and Russian civilizations in the social, political, religious, and cultural spheres. Taught in English. Same as RUSS 3201.

**GRMN 3501-3. German-Jewish Writers: From the Enlightenment to the Present.** Provides insight into the German-Jewish identity through essays, autobiographies, fiction, and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch. Same as JWST 3501. Approved for arts and sciences core curriculum: human diversity.

**GRMN 3502-3. Literature in the Age of Goethe.** Features the writings of Germany's major literary figures from 1749 to 1832. Special attention is paid to the formation of literary periods, genres, aesthetic, and socio-historical developments contributing to the birth of modernism in German intellectual history

and literature. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 3503-3. German Film Through World War II.** History and theory of Weimar and Nazi film with sociocultural emphasis. Taught in English. Same as FILM 3503.

**GRMN 3504-3. Topics in German Film.** A comparative analysis of key issues in German culture as they are represented in film and other media, e.g., technology, architecture, women, and the Holocaust. May be repeated up to 6 total credit hours when topic varies. Same as FILM 3504.

**GRMN 3505-3. The Enlightenment: Tolerance and Emancipation.** Examines the enlightenment belief in reason and the common humanity of all individuals and cultures. Emphasizes arguments for and against freedom of religion, abolition of slavery, and emancipation of women in 18th century European and American literature and thought. Same as HUMN 3505. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 3513-3. German Film and Society 1945–1989.** Introduces issues in German society through film during the Cold War. Focus on East and West Germany, though some other German language films may be included. Emphasis is on reading films in their social, historical, and political contexts. Taught in English. Same as FILM 3513.

**GRMN 3514-3. German Film and Society after 1989.** Introduces post-1989 German culture through film. The course emphasizes films in their socio-historical contexts and explores developments in German culture during and after the unification. Taught in English. Same as FILM 3514.

**GRMN 3601-3. German Women Writers.** Explores writing by German/Austrian women from 1945 to the present, with special attention to the representation of the Holocaust, the continuation of avant-garde traditions, innovations in literary form, and feminism. Visual arts, film, and feminist theory will also be considered in their relation to literature. Taught in English. Same as WMST 3601. Approved for arts and sciences core curriculum: human diversity.

**GRMN 3702-3. Dada and Surrealist Literature.** Surveys the major theoretical concepts and literary genres of the Dada and Surrealist movements. Topics include Dada performance and cabaret, the manifesto, montage, the ready-made, the Surrealist novel, colonialism and the avant-garde, and literary and philosophical precursors to the avant-garde. Taught in English. Same as HUMN 3702. Approved for arts and sciences core curriculum: literature and the arts.

**GRMN 4251-3. Marxism.** Historical and systematic study of principal themes of Marxist thought, from its Hegelian origins to its contemporary varieties, emphasizing the works of Marx and Engels. Prereq., 12 hours of GRMN or PHIL course work or instructor consent. Same as PHIL 4250.

**GRMN 4253-3. Philosophy of Language.** Surveys seminal essays from Frege to the present on the philosophy of language. Taught in English.

**GRMN 4301-3. Gender, Race, and Immigration in Germany and Europe.** Introduce students to debates surrounding migration and race in contemporary Germany. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, magazine images, etc. Topics include: questioning "multiculturalism," self-representation, integration, Islam, citizenship, violence, public space, youth culture, racism and nationalism. Same as GRMN 5301 and WMST 4301. Approved for arts and sciences core curriculum: human diversity.

**GRMN 4501-3. Seminar: Literature in Cultural Context.** Provides a broader basis for the work of literature, viewing it from various cultural perspectives. Specific content of course is defined by the instructor. May be repeated up to 6 total credit hours when topic varies.

**GRMN 4502-3. Nietzsche: Literature and Values.** Emphasizes Nietzsche's major writings from 1872 to 1888 with particular attention to the critique of Western values. Includes a systematic exploration of doctrines, concepts, and ideas leading to the values of creativity. Same as HUMN 4502. Approved for arts and sciences core curriculum: ideals and values.

**GRMN 4503-3. Issues in German Thought.** Provides the opportunity to examine major issues in German philosophical, social, and religious thought from the end of German idealism to existentialism and critical theory. Emphasizes

the relationship between ideas and social and political action. May be repeated up to 6 total credit hours when topic varies.

**GRMN 4504-3. Goethe's *Faust*.** Systematic study of the Faust motif in Western literature, with major emphasis on *Faust I* and *II* by Goethe and Thomas Mann's *Doctor Faustus*. Same as GRMN 5504, COML 5504 and HUMN 4504. Approved for arts and sciences core curriculum: literature and the arts.

## German Graduate Courses

**GRMN 5010-3. Bibliography and Methods of Research.** Required of all German MA students. Training in the use of reference works for conducting research in the humanities and social sciences. Analysis of, and hands-on practice with, bibliographic tools specific to German, as well as reference tools inclusive of German-area materials but broader in their scope. Students learn proper procedure for manuscript preparation and submission. Prereq., graduate standing or instructor consent.

**GRMN 5020-3. Applied Linguistics and Foreign Language Teaching Methodology.** Required of all graduate teaching assistants, this course provides a knowledge of the aspects of German linguistics that are important for teaching German and a survey of foreign language teaching methods and second language acquisition research. Prereq., graduate standing or instructor consent.

**GRMN 5030-3. Foundations of Critical Theory.** Study of selected texts from the German philosophical tradition of the 19th century, including substantial readings from Kant and Hegel, with attention to theoretical philosophy (epistemology) and practical philosophy (ethical theory). Required course for the graduate certificate in Critical Theory. Recommended prereq., some background in philosophy.

**GRMN 5210-3. Seminar: The Age of Enlightenment.** Examines the influence of the emerging middle class on the transformation of aesthetic and societal values. Major works of theory, philosophy, literature, and criticism by Lessing, Herder, Kant, J. E. Schlegel, and others. Examines major literary and cultural influences from France and Great Britain. Prereq., graduate standing or instructor consent.

**GRMN 5220-3. Seminar: Topics in the Age of Goethe.** Examines various aspects of German-speaking society from the 1770s to 1830s. Topics may include Sturm und Drang as social commentary; romantic theory in the wake of the French Revolution; romantic nationalism; the Faust theme; Weimar as a cultural center; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5230-3. Seminar: Concepts of the Self from Schlegel to Freud and Jung.** Profound contributions to the discourses of modernity begin with romanticism and lead to the depth-psychology of Freud and Jung. Examines the major stages in this process: the symbolism of the self in romanticism (Schlegel, E.T.A. Hoffmann, Chamisso), the seminal role of Schopenhauer and Nietzsche, and finally the emergence of the self as the hidden god in the thought of Freud, Jung, Hesse, and others. Prereq., graduate standing or instructor consent.

**GRMN 5301-3. Gender, Race and Immigration in Germany and Europe.** Same as GRMN 4301.

**GRMN 5310-3. Seminar: Topics in the 19th Century.** Examines the transformation of realism from Buechner to Gerhart Hauptmann. Topics may include literary responses to the Restoration; intellectuals and the Revolution of 1848; philosophy and literature; theatrical representations of woman, family, and gender; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5320-3. Seminar: The German Novel from 1901–1956.** Beginning with T. Mann's *Buddenbrooks*, charts the rise of the German novel in the early 20th century and examines such topics as Wilhelminian society; intellectuals and World War I; dehumanization and alienation; national socialism and literary exile; and others. Authors include T. Mann, H. Hesse, R. Rilke, F. Kafka, A. Seghers, and A. Zweig. Prereq., graduate standing or instructor consent.

**GRMN 5330-3. Seminar: German Intellectuals and Society Between the Wars.** Examines the period of social crisis and the intellectual responses to the collapse of the prewar order. Gives attention to the antidemocratic thought of Spengler, Juenger, Stefan George and his circle, to the emergence of existentialism with Scheler and Heidegger, and to the search for a new po-

litical humanism as evidenced by the work of Thomas Mann. Prereq., graduate standing or instructor consent.

**GRMN 5410-3. Seminar: Topics in Early 20th Century German Society.** Focuses on major issues, events, movements, and figures prior to World War II. Topics may include the ontology of lyric poetry; Berlin in the 1920s; exiles, their communities, and their writings; women writers from Andreas-Salome to Anna Seghers; topics in German film; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5420-3. Seminar: Topics in Later 20th Century German Society.** Analyzes major currents and events such as the Holocaust, coming to terms with the past (*Vergangenheitsbewältigung*), German Democratic Republic (GDR) literature, and responses to the reunification. Topics may include the Austrians from Anschluss to Haider; Paul Celan; East German writers between Wolf Biermann and Christa Wolf; topics in German film; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduated standing or instructor consent.

**GRMN 5504-3. Goethe's *Faust*.** Same as GRMN 4504, HUMN 4504 and COML 5504.

**GRMN 5510-3. Seminar: Open Topics in German Civilization.** Focuses on cultural issues that cross lines of literary periodization. Topics may include the theater as social criticism from Lessing to Handke; forms of German protest from Luther to Thomas Mann; nihilism from Bonaventura to Thomas Bernhard; topics in German film; and others. May be repeated up to 6 total credit hours when topic varies. Prereq., graduate standing or instructor consent.

**GRMN 5520-3. Seminar: Current Issues in German Literature and Media.** Examines issues pervading contemporary German literature and media, such as concerns of youth, xenophobia, stereotyping as it affects women and men in their relations, work experience, feminism, problems connected with the reunification, and other issues. Prereq., graduate standing or instructor consent.

**GRMN 5900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**GRMN 6900 (1-6). Master's Thesis.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent.

**GRMN 6940 (1-3). Master's Degree Candidate.**

## Germanic and Slavic Courses

**GSLL 1108-3. Introduction to Jewish History.** Surveys Jewish history from the earliest times to the present. Includes biblical history; Judaism in late antiquity, medieval, and early modern times; and special emphasis on the 19th century to the present, including American Judaism, the Holocaust, anti-Semitism, Zionism, and Israel. Same as HIST 1108 and JWST 1108. Approved for arts and sciences core curriculum: historical context.

**GSLL 3401-3. The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe.** Surveys the major works of 20th century central and central east European film and literature. Examines cultural production in the non-imperial countries and non-national languages of the region including Yiddish, Belarusian, Czech, Hungarian, Polish and Romanian, among others. Traces the rise of nationalism over the course of the century from the age of empires through the Cold War. Same as JWST 3401.

**GSLL 5230-3. Russian Cultural Idioms.** Focuses on the critical analysis of the Russian cultural discourse through Russian idioms. Taught in Russian. Same as RUSS 4230.

**GSLL 5352-3. Russian Novel: Theory and Practice.** Examines the Russian novel and its evolution as well as Western and Russian theories of the novel as they engage and reflect upon the claims of modernity. May be repeated up to 6 total credit hours. Same as COML 5352.

**GSLL 5421-3. Gogol.** Explores major fictional and dramatic texts of great Russian writer Nikolai Vasil'evich Gogol (1809–52)—“the strangest prose-poet Russia ever produced” (Nabokov). Works will be analyzed in the context of Western and Russian Romanticism. Relevant nonfiction texts will also be introduced when appropriate. Class will be run largely as group discussion,

with necessary historical and critical background provided. Recommended prereq., RUSS 4811.

**GSLL 5431-3. Dostoevsky.** Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker, and the greatest crime novelist in the world. Same as RUSS 4431.

**GSLL 5441-3. Tolstoy.** Examines the developments of Tolstoy's thought and literary style through study of the novel *War and Peace* and short works from different periods of Tolstoy's writing. Same as RUSS 4441.

**GSLL 5451-3. Chekhov.** Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Same as RUSS 4451.

**GSLL 5471-3. Women in 20th Century Russian Culture.** Acquaints students with major issues concerning women in 20th century Russian culture. Examines sources from folk culture, popular culture, and high culture (poetry, prose, songs, tales, visual art, and cinema) that mythologize or question women's images and societal roles. All texts and films are offered in English translation. Same as RUSS 4471 and WMST 4471.

**GSLL 5830-3. Topics in Literature and History.** May be repeated up to 6 total credit hours. Same as COML 5830.

**GSLL 5851-3. Critical Thinking: Russian Film and Society.** Through structured discussions, selected readings, and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Identification and critical analysis of concepts and assumptions underlying differing cinematic approaches to controversial topics. Same as RUSS 4851.

**GSLL 5861-3. Absurd and Supernatural in Russian Literature.** Studies themes of grotesque, bizarre, surreal, absurd, supernatural, and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharmis, Bulgakov, Siniavskii, Petrushevskiaia, and Pelevin, within contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Recommended prereq., one upper division humanities course. Same as RUSS 4861.

**GSLL 5900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Prereq., graduate standing or instructor consent required.

## Hebrew

**HEBR 1010-4. Beginning Hebrew 1.** First semester Hebrew is a beginning level course designed for students who have little or no prior knowledge of Hebrew. Begins with learning the Hebrew alphabet and immediately starts developing rudimentary Hebrew conversational, reading and writing skills. By the end of the semester students are expected to have attained basic understanding and expressive abilities in Hebrew.

**HEBR 1020-4. Beginning Hebrew 2.** Second semester builds on Hebrew skills introduced in the first semester, with a focus on speaking, comprehension, reading and writing. Students learn new verbal tenses and paradigms. The course blends a communicative method with formal grammatical instruction. By the end of this semester students are expected to be able to converse in, comprehend, and produce written basic Hebrew. Prereq., HEBR 1010 (min. grade C-) or instructor consent.

**HEBR 1030-3. Biblical Hebrew.** This course is designed to enable students to read the Hebrew Bible in the original language. The focus will be the ability to read the various genres of the text, utilizing both the tools of modern language acquisition and the study of classical grammar methods. Same as JWST 1030.

**HEBR 1040-3. Biblical Hebrew 2.** Building on HEBR/JWST 1030, this course continues to build expertise in reading the Hebrew Bible. Modern language acquisition and classical grammar study methods equip students with the tools to translate and read the various genres of the Biblical material. Prereq., HEBR/JWST 1030 or instructor consent. Same as JWST 1040.

**HEBR 2110-4. Intermediate Hebrew 1.** Third semester Hebrew builds on skills introduced in the first two semesters and focuses on speaking, comprehension, reading and writing. Students learn new verbal tenses and paradigms, modes of expression and syntactical forms. The course blends a communicative method with formal grammatical instruction. By the end of the semester

students are expected to be able to converse in, comprehend, and produce written Hebrew at an intermediate level. Meets MAPS requirement for foreign language. Prereq., HEBR 1020 (min. grade C-) or instructor consent.

**HEBR 2120-4. Intermediate Hebrew 2.** Focuses on texts, while still developing speaking, comprehension and writing skills. Students build on grammatical understanding while learning some of the more sophisticated verbal paradigms and nominal patterns. The course blends a communicative method with some formal grammatical instruction. By the end of this semester students are expected to converse in, comprehend, and produce written Hebrew at an intermediate level. Prereq., HEBR 2110 (min. grade C-) or instructor consent.

**HEBR 2350-3. Introduction to Jewish Culture.** Explores the development and expressions of Jewish culture as it moves across the chronological and geographical map of the historic Jewish people, with an emphasis on the variety of Jewish ethnicities and their cultural productions, cultural syncretism, and changes. Sets the discussion in a historical context, and looks at cultural representations that include literary, religious, and visual texts. Taught in English. Same as JWST 2350. Approved for arts and sciences core curriculum: human diversity.

**HEBR 2352-3. Introduction to Modern Jewish History.** Explores the major historical events and socio-cultural themes in modern Jewish history including the French Revolution, the rise of modern anti-Semitism, the international migration of Jews, the Holocaust, and the establishment of Israel. Taught in English. Recommended prereq., HEBR 2350.

**HEBR 2551-3. Jewish World Literature: Modern to Contemporary.** Studies the literary expression of Jewish writers throughout the world in English translation. Gives special attention to questions of secularity versus tradition, identity, cultural change, diaspora and exile. Taught in English. Same as JWST 2551.

**HEBR 3010-3. Third Year Hebrew, First Semester.** Focuses on students' active Hebrew language skills acquired in the first four semesters of Hebrew at CU Boulder in weekly conversation and composition sessions. Develops grammatical understanding with a further exploration of the root, verbal and noun systems. Students are introduced to texts in contemporary Hebrew fiction and poetry, as well as some biblical readings. Prereq., HEBR 2120 (min. grade C-) or instructor consent.

**HEBR 3020-3. Third Year Hebrew, Second Semester.** Focuses on students' Hebrew language skills acquired in the first five semesters of Hebrew at CU Boulder in weekly conversation and composition sessions. Develops grammatical understanding with a further exploration of the root, verbal and noun systems. Students are introduced to texts in contemporary Hebrew fiction and poetry, as well as some biblical readings, academic texts and Israeli newspapers. Prereq., HEBR 3010 (minimum grade C-) or instructor consent.

**HEBR 3202-3. Women, Gender, and Sexuality in Jewish Texts and Traditions.** Reads some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions. Same as JWST 3202. Approved for arts and sciences core curriculum: human diversity.

**HEBR 3840-3. Independent Study.** Prereqs., HEBR 1010, 1020, 2110, and 2120.

**HEBR 3850-3. Independent Study.** Prereqs., HEBR 1010, 1020, 2110, 2120, and 3840.

**HEBR 4101-3. Topics in Hebrew Studies.** Explores topics in Hebrew and Jewish literature and culture. These may include topics such as diasporic literatures, Jewish artists and thinkers, courses on specific authors, figures or communities. Topics change each semester. May be repeated up to 9 total credit hours. Same as JWST 4101.

## Norwegian

**NORW 1010-4. Beginning Norwegian 1.**

**NORW 1020-4. Beginning Norwegian 2.** Prereq., NORW 1010 with a grade of C- or better.

**NORW 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**NORW 2110-4. Second-Year Norwegian Reading and Conversation 1.** Prereq., NORW 1020 with a grade of C- or better. Fulfills the arts and sciences language requirement for the BA and BFA. degrees. Meets MAPS requirement for foreign language.

**NORW 2120-4. Second-Year Norwegian Reading and Conversation 2.** Continuation of NORW 2110, with focus on Norwegian culture and society. Small group work and class discussions. Prereq., NORW 2110 with a grade of C- or better.

**NORW 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Russian

**RUSS 1010-4. Beginning Russian 1.** For students with no previous training in Russian. Credit not granted for this course and RUSS 1050.

**RUSS 1020-4. Beginning Russian 2.** Continuation of RUSS 1010. Prereq., RUSS 1010 (min. grade of C-). Credit not granted for this course and RUSS 1050.

**RUSS 1050-5. Intensive Beginning Russian.** Covers same material as RUSS 1010 and RUSS 1020 combined in one course. Focuses on acquiring basic grammar (all cases for nouns, adjectives and possessives, verb conjugations, in all three tenses), and ability to understand and speak basic everyday Russian. Develops basic reading and writing skills and provides exposure to the fundamentals of the Russian culture. Credit not granted for this course and RUSS 1010 or 1020.

**RUSS 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**RUSS 2010-4. Second-Year Russian 1.** Review and continuation of basic skills learned in the first year: reading, writing, speaking, and oral comprehension. Prereq., RUSS 1020 (min. grade C-). Meets MAPS requirement for foreign language. Satisfies arts and sciences language requirement.

**RUSS 2020-4. Second-Year Russian 2.** Continuation of RUSS 2010. Prereq., RUSS 2010 (min. grade of C-).

**RUSS 3000-3. Advanced Conversation.** Enables students to speak and understand contemporary Russian. Discussion topics and source materials vary. May be repeated up to 6 total credit hours. Prereq., RUSS 2010.

**RUSS 3010-3. Third-Year Russian 1.** Review of Russian grammar coordinated with reading, speaking, writing, and understanding modern Russian. Uses some texts from modern Russian literature. Prereq., RUSS 2020. Credit not granted for this course and RUSS 3060.

**RUSS 3020-3. Third-Year Russian 2.** Continuation of RUSS 3010. Prereq., RUSS 3010.

**RUSS 3050-3. Business Russian.** Studies general commercial practices, vocabulary, and terminology applied in various business transactions. Emphasizes oral and written communication and correspondence. Prereq., RUSS 2020 or instructor consent.

**RUSS 3060-3. Advanced Russian for Heritage Speakers (Part 1).** Enhances heritage student competence and performance in Russian language. The course offers intensive review of Russian grammar and focuses on developing advanced reading, writing and translation skills. Readings are selected from a wide range of contemporary writings that reflect current issues in Russia. Credit not granted for this course and RUSS 3010.

**RUSS 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**RUSS 3930 (1-6). Russian Internship.** Provides an academically supervised opportunity for upper-division students to earn credit while working for public or private organizations. Students apply skills and knowledge earned in the major, and supplement their work experience through directed readings and assignments. May be repeated up to 6 total credit hours. Restricted to junior and senior RUSS majors.

**RUSS 4010-3. Advanced Conversation and Composition 1.** Prereq., RUSS 3020.

**RUSS 4020-3. Advanced Conversation and Composition 2.** Prereq., RUSS 4010.

**RUSS 4060-3. Advanced Russian for Heritage Speakers (Part 2).** Enhances heritage student competence and performance in Russian language. The course offers intensive review of Russian grammar and focuses on developing advanced reading, writing and translation skills. Readings are selected from a wide range of contemporary writings that reflect current issues in Russia. Recommended prereq., Russian languages skills equivalent to three years of college Russian.

**RUSS 4210 (1-3). Open Topics: Russian Language and Culture.** Selected topics in Russian literature, film, art, and music. May be repeated up to 9 total credit hours when topic varies. Prereq., RUSS 3020.

**RUSS 4230-3. Russian Cultural Idioms.** Focuses on the critical analysis of the Russian cultural discourse through Russian idioms. Taught in Russian. Prereq., RUSS 2020 or instructor consent. Same as GSLL 5230.

**RUSS 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

### *Russian Courses Taught in English*

**RUSS 2211-3. Introduction to Russian Culture.** Provides a chronological overview of civilization in the area now known as Russia, from its beginnings to the end of the Romanov dynasty, paying particular attention to the geographic, social, artistic, economic, and political forces that have combined to give the Russian people and their culture their unique characteristics. Approved for arts and sciences core curriculum: historical context.

**RUSS 2221-3. Introduction to Modern Russian Culture.** Introduces students to major trends in Russian culture from the 1890's to the present, through the study of literature, art, architecture, music, journalism and film in an historical context. Addresses such questions as: how have past events affected Russian society? How can we use knowledge about Russia's past to understand social and cultural forces today? Approved for arts and sciences core curriculum: contemporary societies or historical context.

**RUSS 2231-3. Fairy Tales of Russia.** Provides a general introduction to fairy tales including various theoretical approaches to classifying and interpreting them; introduces students to a wide selection of Russian folk and fairy tales. Examines the cultural, social and political values they reflect, as well as the continuing influence of fairy tales and folk beliefs in Russian literature, music, folk art, and film, as well as in the political propaganda of the 20th century. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 2471-3. Women in Russian Culture: From Folklore to the 19th Century.** Explores the changing role and cultural images of women as reflected in Russian folklore, medieval documents, and literature (fiction and non-fiction) of the 10th-19th centuries. Focuses on the construction of gender in traditional (patriarchal) Russian culture and on the strategies of women's resistance to the political, social and cultural implications of gender stereotypes. Although the course includes works of Russian women and men alike, it intends to revise the canon of Russian culture by reading them through the prism of gender issues of their times. Knowledge of Russian is not required. Taught in English. Approved for arts and sciences core curriculum: historical context.

**RUSS 2501-3. Russia Today.** Introduces students to post-communist Russia, its values and ideologies. It is equally wrong to interpret post-Soviet society through the prism of the Cold War as through the models of contemporary post-industrial capitalism. Neither totalitarian nor liberal, contemporary Russia raises numerous questions about such ideological and cultural constructions as neo-liberalism and capitalism, nationalism, globalization, the state power, and popular vs. high cultures. Approved for arts and sciences core curriculum: contemporary societies.

**RUSS 3201-3. German and Russian Culture in Comparative Perspective.** Comparative overview of the evolution of German and Russian civilizations in the social, political, religious and cultural spheres. Taught in English. Same as GRMN 3201.

**RUSS 3211-3. History of Russian Cinema.** Surveys Russian cinema in historical and cultural context from early 20th century to the present. Prereq., RUSS 2221 or FILM 1502. Same as FILM 3211. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 3231-3. Laughter in Slavic Cultures.** Examines forms, genres and social functions of laughter in Slavic cultures (Russian, Polish, Czech, Serbian, and others). Analysis of the carnivalesque, grotesque, and irony in the works of

Gogol, Chapek, Hashek, Lem, Kundera, Gombrowicz, Kharms, Zoshchenko, If and Petrov, Kusturica, Kieslewsky, and other authors; also provides an introduction to literature and film of Eastern Europe. Taught in English.

**RUSS 3301-3. Contemporary Issues in Russian Film.** Examines the relationship between politics, economics, aesthetics, and the way moral and social issues are treated in noteworthy Russian films from the last 20 years. Same as FILM 3301.

**RUSS 3601-3. Russian Culture Past and Present.** Russian culture from the ninth century to the present. Focuses on interdisciplinary exploration of literature, folklore, art, architecture, and music through study in St. Petersburg. Offered abroad only. Similar to RUSS 1601. Approved for arts and sciences core curriculum: historical context.

**RUSS 3701-3. Slavic Folk Culture: Ideals and Values in the Contemporary World.** Explores contemporary Slavic and American folk practices and investigates the possible origins and consequences of such practices. Focuses upon the value systems these practices represent, and ways that core values help to define identities and cultures. Topics include folk religion, magic, healing, life cycle and calendar rituals and folk music. Approved for arts and sciences core curriculum: ideals and values. Taught in English.

**RUSS 4221-3. Cultural Mythologies of Russian Communism.** Investigates how cultural and ideological myths as those of a great leader, utopian future, a new man, a hero, "enemies of the people", and some others were produced in Soviet Russia from the 1920s to the 1950s; what general mechanisms of the cultural production in the age of modernity do they reveal. Recommended prereqs., RUSS 4821, 2221, 2211. Approved for arts and sciences core curriculum: ideals and values.

**RUSS 4301-3. American-Russian Cultural Relations.** Surveys the development of American-Russian cultural relations from the second half of the 18th century to the present. Examines the character and significance of Russian-American relations in social, intellectual, artistic, and other spheres from a comparative perspective. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: historical context or U.S. context.

**RUSS 4421-3. Gogol.** Explores major fictional and dramatic texts of great Russian writer Nikolai Vasil'evich Gogol (1809–52) "the strangest prose-poet Russia ever produced" (Nabokov). Works will be analyzed in the context of Western and Russian Romanticism. Relevant nonfiction texts will also be introduced when appropriate. Class will be run largely as group discussion, with necessary historical and critical background provided. Same as GSLL 5421.

**RUSS 4431-3. Dostoevsky.** Focuses on close reading of major novels and other works by Dostoevsky, one of the most important psychological novelists in modern literature, a profound religious thinker, and the greatest crime novelist in the world. Same as GSLL 5431.

**RUSS 4441-3. Tolstoy.** Examines the developments of Tolstoy's thought and literary style through study of the novel *War and Peace* and short works from different periods of Tolstoy's writing. Recommended prereq., some experience with college-level expository writing. Same as GSLL 5441.

**RUSS 4451-3. Chekhov.** Analyzes the life and creative works of the author of some of the funniest and some of the gloomiest stories in Russian literature. Examines Chekhov's major plays that laid the foundation for modernist theatre. Same as GSLL 5451.

**RUSS 4471-3. Women in 20th Century Russian Culture.** Acquaints students with major issues concerning women in 20th century Russian culture. Examines sources from folk culture, popular culture, and high culture (poetry, prose, songs, tales, visual art, and cinema) that mythologize or question women's images and societal roles. All texts and films are offered in English translation. Recommended prereq., course(s) in literature or film studies, and upper-division writing courses. Same as WMST 4471 and GSLL 5471. Approved for arts and sciences core curriculum: human diversity.

**RUSS 4811-3. 19th Century Russian Literature.** Surveys background of Russian literature from 1800 to 1900. Russian writers and literary problems in the 19th century emphasizing major authors: Pushkin, Lermontov, Gogol, Dostoevsky, Turgenev, Tolstoy, and Chekhov. Same as HUMN 4811. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 4821-3. 20th Century Russian Literature and Art.** Interdisciplinary course emphasizing the influence of art in 20th century Russian literature.



Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the gradual cultural relaxation that culminated in perestroika and glasnost. Same as HUMN 4821. Approved for arts and sciences core curriculum: literature and the arts.

**RUSS 4831-3. Contemporary Russian Literature.** Acquaints students with the most representative works of Russian writers from the 1960s to the present in a broad historical and political perspective. Examines the relationships between ideological concepts and aesthetics, and the treatment of moral and social issues in recent literary works. All readings are provided in translation. Recommended prereq., lower level literature course. Approved for arts and sciences core curriculum: literature and the arts or contemporary societies.

**RUSS 4851-3. Critical Thinking: Russian Film and Society.** Through structured discussions, selected readings, and written assignments, examines topics in Russian film from socio-historical and cultural studies perspectives. Identification and critical analysis of concepts and assumptions underlying differing cinematic approaches to controversial topics. Prereqs., RUSS 2221 or RUSS/FILM 3301 and RUSS 3010 or equivalent. Same as GSLL 5851.

**RUSS 4861-3. Absurd and Supernatural in Russian Literature.** Studies themes of grotesque, bizarre, surreal, absurd, supernatural, and fantastic in Russian short stories and novels of the 19th and 20th centuries. Discusses works by Pushkin, Gogol, Dostoevsky, Kharmis, Bulgakov, Siniavskii, Petrushevskaya, and Pelevin, within contexts of Russian folklore, Freud and Jung's interpretations of jokes and dreams, and Romanticism. Recommended prereq., one upper division humanities course. Same as GSLL 5861.

## Nordic Studies (Scandinavian)

### *Nordic Studies Courses Taught in English*

**SCAN 1202-3. Tolkien's Nordic Sources and *The Lord of the Rings*.** Examines the Nordic aspect of JRR Tolkien's work, especially *The Lord of the Rings*. The course concentrates on the Nordic saga tradition, mythology, folklore and fairy tales Tolkien used as his sources. Students will explore the transformations of these sources from prehistoric times to contemporary cinematic adaptations, while paying special attention to cultural appropriations, national revisions, and political alterations. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SCAN 2201-3. Introduction to Modern Nordic Culture and Society.** Provides a comprehensive introduction to modern Nordic culture and society. Surveys the history of Nordic countries and examines their culture using art, architecture, literature, and film. Studies social issues, environmental concerns, and political patterns. In profiling aspects of culture and society unique to Nordic countries, students arrive at a conception of a collective Nordic identity. Approved for arts and sciences core curriculum: contemporary societies.

**SCAN 2202-3. The Vikings.** Examines the social, cultural, technological, and artistic backgrounds of the Viking experience, charting the history of the period both within the Nordic region and Europe as well as North America. Additionally, looks at some of the lasting influences of the Vikings on Western civilization. Approved for arts and sciences core curriculum: historical context.

**SCAN 2900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SCAN 3201-3. Contemporary Nordic Society and Culture.** Explores contemporary Nordic culture and society with special focus on Iceland. Emphasis is on the relationship between historical, geographic, artistic, and political forces in Iceland and their effects on culture and society. Provides insight into the life and attitudes of contemporary Icelanders and stresses their place in the global culture of today. Recommended prereq., SCAN 2201. Approved for arts and sciences core curriculum: contemporary societies.

**SCAN 3202-3. Old Norse Mythology.** Surveys the mythology and heathen cult practices of the Old Norse world. Students learn to read mythological texts and study the major gods (Odin, Thor, Frey, and Freyja, among others), along with other mythological beings. The course examines and evaluates evidence for beliefs and cult practices in texts, art, archeological finds, and other sources. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3203-3. 19th and 20th Century Nordic Literature.** Examines the Nordic region's influence on social realism, expressionism, and postwar literature, including such themes as women in society, nature and industrialization, and identity and angst. May include works by Ibsen, Strindberg, Dinesen, and Nobel Prize winners Lagerlof, Hamsun, Undset, and Lagerkvist. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3204-3. Medieval Icelandic Sagas.** Advanced introduction to medieval Icelandic saga with readings in the family, outlaw, skald, and legendary sagas as well as the main scholarly approaches to this unique literature. Topics include honor, blood feud, fate, sexuality/gender, oral composition, and legend. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3205-3. Scandinavian Folk Narrative.** Introduces the rich tradition of Scandinavian oral narrative. Looks at relationships between the various genres of oral narrative and their historical, social, and cultural contexts. Genres studied may include ballad, fairy tale, rural legend, and urban legend. Explores various interpretive methodologies. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3206-3. Nordic Colonialisms.** Examines Nordic colonial enterprise and the relationship between the Scandinavian center and colonial peripheries from the Arctic to the Caribbean, Africa, and India. Studies colonial and post-colonial cultures, and postcolonial criticism and theory. Approved for arts and sciences core curriculum: human diversity.

**SCAN 3208-3. Women in Nordic Society: Modern States of Welfare.** Examines the role and status of women and marginalized social classes in the Nordic countries, whose societies have been heralded as egalitarian models since the twentieth century. Texts include a variety of media, from literature to sociological works to artifacts of political and popular culture. Same as WMST 3208. Approved for arts and sciences core curriculum: human diversity.

**SCAN 3209-3. Contemporary Nordic Literature and Film.** Advanced introduction to contemporary Nordic literature and film. Readings/screenings of recent translated Nordic texts and films, presenting a broad spectrum of contemporary issues, along with current critique and theoretical approaches. Topics: history, culture, translation, gender/sexuality, national identity, minority issues, etc. Taught in English.

**SCAN 3506-3. Scandinavian Drama.** Examines the many contributions of Scandinavian dramatists to world theater from the 18th century to the present. With emphasis on Holberg, Bjornson, Ibsen, Strindberg, and Bjorneboe, surveys Enlightenment comedy, national romanticism, realism, naturalism, symbolism, expressionism, and Brechtian epic theater. Taught in English. Approved for arts and sciences core curriculum: literature and the arts.

**SCAN 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Swedish

**SWED 1010-4. Beginning Swedish 1.**

**SWED 1020-4. Beginning Swedish 2.** Prereq., SWED 1010 (min. grade of C-).

**SWED 1900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

**SWED 2110-4. Second-Year Swedish Reading and Conversation 1.** Prereq., SWED 1020 (min. grade C-). Meets MAPS requirement for foreign language. Fulfills the arts and sciences language requirement for the BA and BFA degrees.

**SWED 2120-4. Second-Year Swedish Reading and Conversation 2.** Prereq., SWED 2110 with a grade of C- or better.

**SWED 3900 (1-6). Independent Study.** May be repeated up to 6 total credit hours.

## Global Studies Residential Academic Program

**GSAP 1000-3. World Politics and Society.** Explores the history leading up to and away from the attacks of 9/11 within an American framework. Topics to be covered include: America's relationship with key countries since 1945; the rise of Muslim extremism; modern terrorism and its meaning; the importance

of oil; and the events of 9/11 and the Bush Administration's response to it, at home and abroad. Restricted to G-RAP students.

**GSAP 2010-3. Introduction to National Security.** Introduces national and international security studies to students. The course examines the influence of history, domestic politics, and international events and actors on the development of security policy. Restricted to G-RAP students.

**GSAP 2020-3. Topics in National Security.** Intensive look at specific security issues. This course focuses on the specifics of policy development related to functional issues (political, military, and non-traditional) as well as threats within specific regions. In addition to class, each student will focus on an issue of their choosing. Recommended prereq., GSAP 2010. Restricted to G-RAP students.

## Hebrew

See *Germanic and Slavic Languages and Literature*.

## History

*Many 1000-level courses, most 3000-level seminars, and all 4000-level courses count toward the 36 credit hour major requirements. Only one 2000-level course may be applied to the major requirements. The remaining 1000-level courses and any further 2000-level courses count within the 45 credit hour maximum in history but do not fill requirements toward the 36 credit hour major.*

### Methodological, Comparative, and General

#### **HIST 1010-3. Western Civilization 1: From Antiquity to the 16th Century.**

Surveys the development of Western civilization from its beginnings in the ancient Near East through the Reformation of the 16th century. Also available through correspondence study. Credit not granted for this course and HIST 1030. Meets MAPS requirement for social science: general and world history. Approved for arts and sciences core curriculum: historical context.

**HIST 1020-3. Western Civilization 2: 16th Century to the Present.** Surveys political, economic, social, and intellectual developments in European history from the 16th century to the present. Similarities and contrasts between European states are underscored, as is Europe's changing role in world history. Also available through correspondence study. Credit not granted for this course and HIST 1040. Meets MAPS requirement for social science: general and world history. Approved for arts and sciences core curriculum: historical context.

**HIST 2100-3. Revolution in History.** Examines the causes, character, and significance of political revolution in world history. Concentrating on one of the major revolutions of modern history, it examines why revolutions occur, who participates in revolution, and to what effect. Specific course focus varies. Approved for arts and sciences core curriculum: historical context.

**HIST 2170-3. History of Christianity 1: To the Reformation.** General introduction to the history of Christianity from its beginnings through the first period of the Protestant Reformation. Examines religious life and the church in relation to its social and cultural setting. Approved for arts and sciences core curriculum: historical context.

**HIST 3010-3. Communist Societies in Historical Perspective.** Examines communist societies in Asia and Europe, 1917 to the present, using primary sources to compare how different social groups experienced such regimes, the social bases of revolutions that created and ended communism, and why some communist regimes have survived. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3050-3. Seminar in World History.** Organized around themes that change year to year, this seminar allows students to explore and research processes, phenomena, and events of global significance in historical context. Stress will be upon subjects that span multiple world areas. Possible topics include: the international arms trade; slavery; health and disease; youth culture; women's rights; genocide. See department for current theme. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3110-3. Honors Seminar.** Practical historiography for students who wish to write a senior honors thesis. Emphasizes choice of topic, critical methods, research, organization, argumentation, and writing. Prereqs., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-), honors standing, and instructor consent.

**HIST 3120-3. Honors Thesis.** Prereq., HIST 3110 and instructor consent.

**HIST 3840 (1-3). Independent Study.**

**HIST 4020-3. Capstone: Comparative History.** Explores historical themes from a comparative perspective. As a culmination of the major, it encourages students to think more analytically about historical change. Consult the online Schedule Planner for specific topics. Team-taught by several faculty. May be repeated up to 6 total credit hours within the degree. Restricted to senior history majors and minors.

**HIST 4030-3. History of Slavery: Origins to Present.** Examines slavery across the globe from its origins in ancient societies to the present. Includes the legal, social, economic, linguistic, and gender aspects of slavery, among other subjects. Restricted to sophomores/juniors/seniors.

**HIST 4040-3. The History of Space Exploration and Defense.** This course examines the development and impact of American, Soviet/Russian, and European civilian and military space activities from the dawn of the space age to the space challenges of the 21st century. Restricted to juniors/seniors.

**HIST 4050-3. The World War II Era.** The World War II era witnessed transformations in the social, political, and economic orders across the globe. Traces the domestic and international developments, including military issues, that shaped the period in Europe, Asia, and the United States and assesses the war's legacy. Restricted to juniors/seniors.

**HIST 4110-3. Natives and Newcomers: Encounters in the Americas.** Focuses on the first generations of interaction between natives and newcomers in the Americas, 1492–c. 1650. Class will open with general section on colonialism and contact dynamics, then explore four contact areas (Caribbean, Valley of Mexico, St. Lawrence River Valley, Chesapeake) in depth. In-class discussion of primary sources a critical component of the course. Prereq., junior standing or successful completion of one lower-division history course.

**HIST 4640-3. Women, Gender and War.** Study of how women experience war, and how the structure, practice and memory of war, and the rights and obligations of military service structure gender (masculinity and femininity) and are structured by the gender system. Prereq., HIST 1020 or 1025 or 1040 or 1045, or WMST 2000. Same as WMST 4640.

**HIST 4820-3. Human Rights: Historical Perspectives.** Examines the history of modern ideas of human rights. Focuses on themes such as the universalism/cultural relativism debate, colonialism, nationalism, refugees and stateless peoples, the United Nations and humanitarianism, ethnic genocide in Rwanda, and human rights abuses by the Taliban regime in Afghanistan. Prereq., 6 hours of HIST credit.

**HIST 4930 (1-3). History Internship.** Matches selected students with supervised internships in professional archives research libraries, historical associations, and special projects. Interns apply their academic area specialty to their work in the field. Internships have a work and academic (reading and writing) component. May be repeated up to 6 total credit hours. Recommended prereq., completion of lower-level HIST course work (HIST 1015/1025, etc.). Restricted to junior or senior HIST majors. May be taken pass/fail only.

**HIST 5000-3. Historical Methods: Introduction to the Professional Study of History.** Introduces purposes, materials, and techniques of historical scholarship. Theory, practice, and criticism.

**HIST 5840 (1-3). Independent Study.**

**HIST 6020-3. Modern Empires: Readings in Imperial History.** Introduces major topics and themes in imperial history. Reviews central theories of modern colonial empire, ranging from economic and political motivations for expansion, to the cultural and social impact of empire, to post-colonialism.

**HIST 6030-3. Readings: Frontiers and Borderlands in the Americas.** Introduces classic and recent scholarship on frontiers and borderlands in the Americas. Chronological focus will vary by semester, from contact through twentieth century. A hemispheric approach encourages comparative insights

about topics such as colonialism and ecological change, war and violence, indigenous resistance, acculturation, ethnogenesis, and evolving ideas about race, gender, and identity at the margins of empires and nation-states. Restricted to graduate students.

**HIST 6150-3. Critical and Theoretical Issues in Museums.** Investigates key problems facing museum institutions and studies the staging and representation of historical knowledge, the ethics of collecting and display, the changing nature and uses of historical evidence, and relations between curatorial practice, collecting, and field work. Critically examines different approaches to museums and museology in various disciplines, both past and present. Prereq., MUSM 5011 or instructor consent. Same as MUSM 6150, ARTH 6150, and ANTH 6150.

**HIST 6330-3. History of Sex and Sexuality.** Examines major historical trends in the study of meanings and practices of sex and sexuality. Focuses on emergence and negotiation of sexual matters in circumstances where sex and identity were not coterminous. Restricted to graduate students.

**HIST 6500-3. Comparative Labor History.** Examines major issues in labor history through comparative study of Europe, the United States, and Latin America. Issues to be studied include working-class formation, the development of worker identities, and workers and the state.

**HIST 6940 (1-3). Master's Degree Candidate.**

**HIST 6950 (1-6). Master's Thesis.**

**HIST 7840 (1-3). Independent Study.**

**HIST 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for no fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Europe: Ancient and Medieval

**HIST 1051-3. The World of the Ancient Greeks.** Surveys the emergence, major accomplishments, failures, and decline of the world of the ancient Greeks, from Bronze Age civilizations of the Minoans and Mycenaeans through the Hellenistic Age (2000-30 B.C.) Same as CLAS 1051. Approved for arts and sciences core curriculum: historical context.

**HIST 1061-3. The Rise and Fall of Ancient Rome.** Surveys the rise of ancient Rome in the eighth century B.C. to its "fall" in the fifth century A.D. Emphasizes political institutions, foreign policy, leading personalities, and unique cultural accomplishments. Same as CLAS 1061. Approved for arts and sciences core curriculum: historical context.

**HIST 2041-3. War and Society in Ancient Greece.** Studies Greek warfare in its cultural, social, and economic contexts, in the light of anthropological comparisons and modern theories. No Greek or Latin required. Same as CLAS 2041.

**HIST 3011-3. Seminar in Ancient History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3511-3. Seminar in Medieval History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3841 (1-3). Independent Study.**

**HIST 4021-3. Athens and Greek Democracy.** Studies Greek history from 800 B.C. (the rise of the city-state) to 323 B.C. (the death of Alexander the Great). Emphasizes the development of democracy in Athens. Readings are in the primary sources. Restricted to sophomores/juniors/seniors. Same as CLAS 4021.

**HIST 4031-3. Alexander the Great and the Rise of Macedonia.** Covers Macedonia's rise to dominance in Greece under Philip II and the reign and conquests of Alexander the Great. Prereq., one of the following: CLAS 1509, 3039, 3113, 4051, 4139, 4149, CLAS/HIST 1051, 2041, 4021, or 4041. Same as CLAS 4031.

**HIST 4041-3. Classical Greek Political Thought.** Studies main representatives of political philosophy in antiquity (Plato, Aristotle, Cicero) and of the most important concepts and values of ancient political thought. Prereq., CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010, PSCI 2004, or PHIL 3000. Restricted to sophomores/juniors/seniors. Same as CLAS 4041 and PHIL 4210.

**HIST 4061-3. Twilight of Antiquity.** Explores the reasons for the fall of the Roman Empire in the western Mediterranean and its survival in the east as Byzantium. Emphasizes Christianity; barbarians; social, economic, and cultural differences; contemporary views of Rome; and modern scholarship. No Greek or Latin is required. Same as HIST 5061 and CLAS 4061.

**HIST 4071-3. Seminar in Ancient Social History.** Considers topics ranging from demography, disease, family structure, and the organization of daily life to ancient slavery, economics, and law. Focuses either on Persia, Greece, or Rome and includes a particular emphasis on the methodology required to reconstruct an ancient society, especially the interpretation of problematic literary and material evidence, and the selective use of comparisons with better known societies. No Greek or Latin required. Restricted to sophomores/juniors/seniors. Same as CLAS 4071.

**HIST 4081-3. The Roman Republic.** Studies the Roman Republic from its foundation in 753 B.C. to its conclusion with the career of Augustus. Emphasizes the development of Roman Republic government. Readings are in the primary sources. No Greek or Latin required. Same as CLAS 4081.

**HIST 4091-3. The Roman Empire.** Studies Imperial Roman history beginning with the Roman Revolution and ending with examination of the passing of centralized political authority in the western Mediterranean. Emphasizes life, letters, and personalities of the Empire. Restricted to sophomores/juniors/seniors. Same as CLAS 4091.

**HIST 4121-3. Diving for the Ancient Past.** Through discussions, readings, videos, and student research, this course explores all aspects of Mediterranean maritime archaeology and examines the role of the sea and seafaring in the ancient civilizations of Greece and Rome. Prereq., HIST 1051 or 1061. Restricted to sophomores/juniors/seniors.

**HIST 4511-3. Europe in the Dark Ages (400–1000 A.D.).** Examines the history of Europe from the fall of the Roman Empire to the turn of the first millennium. Treats social, political, and religious transformations in the barbarian kingdoms, and considers the persistence of Roman institutions and culture and the impact of Christianity in northern Europe. Prereq., HIST 1010, 1030, 2170 or 2543. Restricted to sophomores/juniors/seniors.

**HIST 4521-3. Europe in the High Middle Ages (1000–1400 A.D.).** Examines the history of Europe from the emergence of feudal institutions to the rise of nation states, with specific attention to social, intellectual and religious change, the role of law and ritual, the crusades and European expansion, and urban growth and identity in the West. Prereq., HIST 1010, 1030, 2170, or 2543. Restricted to sophomores/juniors/seniors.

**HIST 4711-3. On the Fringes of Medieval Europe (950–1350).** Studies the history of medieval Europe and its expansion from the period of the First Crusade through the Black Death. Topics include the role of the Mediterranean, the expansion of European modes of government and law, the commercial revolution, and the role of Christianization with a specific emphasis on process of colonization, conquest, and crusade. Prereq., HIST 1010, 1030, 2170, or 2543. Restricted to sophomores/juniors/seniors.

**HIST 4761-3. Roman Law.** Same as HIST 5761 and CLAS 4761.

**HIST 5061-3. Twilight of Antiquity.** Same as HIST 4061 and CLAS 5061.

**HIST 5761-3. Roman Law.** Same as HIST 4761 and CLAS 5761.

**HIST 5841 (1-3). Independent Study.**

**HIST 6511-3. Readings in Medieval History.** Prereq., instructor consent.

**HIST 7011-3. Seminar in Ancient History.** Examines topics in ancient Greek and Roman history at an advanced seminar level. May be repeated up to 6 total credit hours. Same as CLAS 7011.

**HIST 7551-3. Seminar: Medieval History.**

**HIST 7581-3. Latin Paleography.** Discusses the development of formal scripts from the late Roman Empire to the 15th century. Provides practice in identification, transliteration, and translation of medieval manuscripts. Prereqs., graduate standing and reading knowledge of Latin.

**HIST 7841 (1-3). Independent Study.**

## Europe: Modern

**HIST 2002-3. Introduction to Central and East European Studies.** Examines major themes in the history of Russia and East-Central Europe since the early modern era, introduces the literature and arts of the region, and presents current political, social, and economic issues. Same as CEES 2002. Approved for arts and sciences core requirement: historical context.

**HIST 2112-3. Early Modern Societies (1450–1700).** Examines major themes in European Early Modern history. Issues to be explored include the Renaissance and the Reformation, popular culture, social history, and states and warfare. Specific course focus may vary. Similar to HIST 2113. Approved for arts and sciences core curriculum: historical context.

**HIST 2222-3. War and Society in the Modern World.** Focuses on war in European and/or American history. Explores the character, origins, and social, political, and intellectual impact of war in contexts ranging from several centuries of international conflict to the experience of individual nations in specific wars. Specific course focus may vary. Approved for arts and sciences core curriculum: historical context.

**HIST 3012-3. Seminar in Modern European History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3112-3. Seminar in Renaissance and Reformation.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3212-3. Seminar in Early Modern Europe.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3842 (1-3). Independent Study.**

**HIST 4112-3. Venice and Florence in the Renaissance.** Comparative urban study of Florence and Venice from 13th through 16th centuries. Principal subjects are the distinctive economies of the cities, political developments, Renaissance humanism, patronage of the arts, and foreign policy. Restricted to sophomores/juniors/seniors.

**HIST 4122-3. Europe During the Renaissance.** Explores the history and culture of Western Europe, 1300–1520. Comprehensive in scope, with analysis of political, economic, social, religious, intellectual, and artistic matters. Discusses significance of the Renaissance for origins of modern civilization. Restricted to sophomores/juniors/seniors.

**HIST 4212-3. Early Modern Europe: Religion, Politics, and Society (1500–1789).** Examines European history through three centuries of dynamic change. Addresses the rise of centralized nation-states, the Reformation and Counter-Reformation, religious wars, colonialism and racism, shifting class and gender relations, and the emergence of Enlightenment culture. Restricted to sophomores/juniors/seniors.

**HIST 4222-3. War and the European State, 1618–1793.** Studies the development of the European states in response to international power struggles in the 17th and 18th centuries (up to the French Revolution). Restricted to sophomores/juniors/seniors. Same as HIST 5222.

**HIST 4232-3. The Age of Reason, Montaigne to Voltaire.** Studies major European intellectual trends from late 16th century through the Enlightenment. Restricted to sophomores/juniors/seniors.

**HIST 4312-3. 19th Century Europe.** Concerned with major social, political, and cultural developments in Europe from circa 1800 to the outbreak of World War I. Special emphasis is placed upon the Napoleonic experience, the rise of modern nationalism, romanticism, Darwinism and its social applications, the Industrial Revolution, imperialism, the emergence of modern ideologies, and the background of World War I. Prereq., junior or senior standing or instructor consent.

**HIST 4412-3. Europe, 1890–1945.** Examines the origins, character, and significance of the First and Second World Wars for the major nations of Europe during the first half of the 20th century. Restricted to juniors and seniors.

**HIST 4422-3. World War I: The Brutalization of Europe.** Examines the causes of World War I, the nature of the war itself, and its political, psychological, cultural, and social impacts. Considers the link between World War I and the

rise of modern totalitarian movements and ideologies. Prereq., HIST 1020 or 1040. Restricted to sophomores/juniors/seniors.

**HIST 4442-3. Europe since 1945.** Explores Europe from the end of World War II through the present day. Topics include postwar reconstruction; the cold war; anticommunist opposition and new social movements; consumer culture and punk music; the fall of communism; the Yugoslav wars; and European unity. Prereq., HIST 1020 or 1040 or 4412, or PSCI 2012. Restricted to sophomores/juniors/seniors.

**HIST 5012-3. Graduate Colloquium in European History.** Acquaints students with key works in the literature of European history, and addresses matters of method and interpretation. May be repeated up to 6 total credit hours. Prereq., admission to the graduate program in history.

**HIST 5222-3. War and the European State, 1618–1793.** Prereqs., HIST 1010 and HIST 1020 or equivalent; and at least two of the following: HIST 4133, 4223, 4232, 4613, or equivalent upper-division graduate courses. Same as HIST 4222.

**HIST 5842 (1-3). Independent Study.**

**HIST 6012-3. Readings in Modern European History.**

**HIST 6122-3. Readings in 16th Century Europe.**

**HIST 6212-3. Readings in 17th Century Europe.**

**HIST 7052-3. Seminar: Modern European History.**

**HIST 7252-3. Seminar: Early Modern Europe, 16th to 18th Centuries.**

**HIST 7842 (1-3). Independent Study.**

## Europe: Specific Countries

**HIST 2103-3. The History of England to 1660.** Deals with Roman, medieval, and early modern periods. Covers the demographic, economic, and social patterns, political and religious developments, and cultural changes that contributed to the formation of the English nation. Approved for arts and sciences core curriculum: historical context.

**HIST 2123-3. The History of England, 1660 to Present.** Deals with the period from the 17th century to the present. Political, economic, social, and imperial developments that contributed to creation of the modern industrial and democratic state are the major issues covered. Approved for arts and sciences core curriculum: historical context.

**HIST 2543-3. Medieval Societies.** Examines major themes in European history during the medieval period: the origins and development of states, social and economic life, religion, and popular culture. Specific course focus may vary. Approved for arts and sciences core curriculum: historical context.

**HIST 3113-3. Seminar in Medieval and Early Modern English History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3133-3. Seminar in Britain since 1688.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3713-3. Seminar in Russian History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3843 (1-3). Independent Study.**

**HIST 4013-3. English Constitutional History to 1688.** Examines the origins and developments of English legal and political institutions, including kingship, the common law, procedure, and the court and jury system from the Anglo-Saxon period to the 17th century. Emphasizes the implications of these institutions for the development of contemporary American and English legal systems. Prereq., HIST 1010, 1030, 2103, or 2543.

**HIST 4053-3. Britain and the Empire, 1688–1964.** Examines the external polity of Great Britain from 1688 to 1964 in Europe, the East, Africa, and the Americas. Restricted to sophomores/juniors/seniors. Same as HIST 5053.

**HIST 4063-3. Women in Victorian England.** Examines changing roles and status of women in a period of expansion. Studies the impact of industrialization on working women, sexuality, family planning, expansion of women in

education, politics and the professions, the single women crisis, and women's rights. Restricted to sophomores/juniors/seniors. Same as WMST 4063.

**HIST 4083-3. Revolution and Nationalism in Modern Ireland.** Surveys Irish nationalist movements since the eighteenth century, treating constitutional nationalism, revolutionary republicanism, and Gaelic cultural movements while also examining the development of Unionism in Ulster as a response to political and cultural nationalism. Emphasizes the political, religious, and cultural roots of the current sectarian crisis in Northern Ireland, and analyzes that crisis up to the present day. Prereqs., HIST 1020, 1040, 2123, or 4053. Restricted to sophomores/juniors/seniors. Credit not granted for this course and HIST 2513.

**HIST 4123-3. Medieval England.** Treats the major developments in English history from the Anglo-Saxon period through the 15th century. Emphasizes late medieval English society during the 13th and 14th centuries. Restricted to juniors/seniors.

**HIST 4133-3. Tudor England.** Deals with the history of England from 1485 to 1603. Examines patterns of daily life, the impact of the Reformation and the Renaissance, and the development of Parliament and the monarchy under the Tudor rulers, especially Henry VIII and Elizabeth. Prereqs., HIST 1010, 1030, or 2103. Restricted to sophomores, juniors, and seniors.

**HIST 4143-3. Stuart Britain.** Covers the history of the British Isles from 1603 to 1714, the era of the English Civil War and the Glorious Revolution. Traces economic and social relationships, cultural change, and religious and political conflict under the Stuart monarchs. Prereq., HIST 1010, 1030, 2103, or 2123. Restricted to sophomores, juniors, and seniors.

**HIST 4153-3. Emergence of Modern Britain, 1688–1852.** Surveys British history from the Revolution of 1688 to the Great Exhibition in 1851. Topics include creation of the United Kingdom, traditional popular culture, birth of a consumer society, the British Enlightenment, the Evangelical Revival, loss of the American colonies, imperial expansion in Asia, war with Revolutionary and Napoleonic France, the Industrial Revolution, and the impact of utilitarianism and political radicalism. Prereq., HIST 1020, 1040, 2103, or 2123. Restricted to sophomores/juniors/seniors.

**HIST 4223-3. Revolutionary France.** Examines the two questions most fundamental to any scholarly understanding of the French Revolution: What were the political, social, and cultural causes of revolution in 1789? Why did the French Revolution become increasingly radical after 1789? Restricted to juniors and seniors.

**HIST 4233-3. History of France since 1815.** Examines the ongoing struggle between the revolutionary and counter-revolutionary traditions of France and how it shaped the political history and affected the social, cultural, and intellectual character of the nation from 1815 to the present. Restricted to juniors and seniors.

**HIST 4313-3. History of Italy.** Survey of political, social, and intellectual history of Italy and its people. Taught in English. Restricted to sophomores/juniors/seniors. Same as ITAL 4250.

**HIST 4413-3. German History to 1849.** Cultural, political, and social history of Germany up to and including the revolutions of 1848. Emphasizes the political history of Prussia and such cultural phenomena as German romanticism. Restricted to juniors and seniors.

**HIST 4423-3. German History since 1849.** Cultural, political, and social history of Germany since 1849. Emphasizes German unification, Bismarkian foreign policy, the rise of neoromanticism, Weimar politics, and the rise of national socialism. Restricted to juniors and seniors.

**HIST 4433-3. Nazi Germany.** Focuses on the political, social, cultural, and psychological roots of national socialism, with the nature of the national socialist regime, and those politics and actions that came directly out of its challenge to values central to Western civilization. Studies how Nazism came out of this civilization. Restricted to seniors.

**HIST 4613-3. History of Eastern Europe to 1914.** Examines the conquering of the kingdoms of Eastern Europe by the Russian, Prussian, Habsburg, and Ottoman Empires, and the formation of national consciousness among the subject peoples of the region before World War I. Prereq., HIST 1020 or 1040. Restricted to sophomores/juniors/seniors.

**HIST 4623-3. History of Eastern Europe since 1914.** Examines the struggle of nations of eastern Europe to assert their independence, from break-up of the imperial system at the end of World War I, through the Soviet bloc that emerged after World War II, to the establishment of democratic governments after the 1989 revolutions. Prereq., HIST 1020 or 1040 or PSCI 2012. Restricted to sophomores/juniors/seniors.

**HIST 4643-3. Poland since the 16th Century: Democracy and Nation.** Traces themes of democracy and nationalism in Polish history from the "noble republic" of the early modern era, through the struggles with fascism and communism in the 20th century, to Poland's current position on the eastern edge of Western Europe. Restricted to sophomores/juniors/seniors.

**HIST 4713-3. History of Russia through the 17th Century.** Introduces the history and culture of Russia from the 9th to the 17th century. Emphasizes selected topics in social, economic, religious, and cultural history, including the formation of the Russian state conversion to Orthodox Christianity, the Mongol invasion, and the reign of Ivan the Terrible. Restricted to juniors and seniors.

**HIST 4723-3. Imperial Russia.** Surveys major cultural, social, and economic changes from the reign of Peter the Great through World War I. Restricted to juniors and seniors.

**HIST 4733-3. The Russian Revolution and the Soviet Regime.** Covers in detail the significant social, economic, and political events of Soviet Russia from the February Revolution of 1917 to the present. Prereq., junior or senior standing.

**HIST 4803-3. Special Topics in European History.** Covers specialized topics in early modern and modern European history, usually focusing on one country. May be repeated up to 6 total credit hours. Prereq., HIST 1010, 1020, 1030, or 1040.

**HIST 5053-3. Britain and the Empire, 1688-1964.** Same as HIST 4053.

**HIST 5843 (1-3). Independent Study.**

**HIST 6113-3. Readings in English History to 1714.**

**HIST 6123-3. Readings in English History since 1688.**

**HIST 6413-3. Readings in Modern German History.** Prereq., general background in European history.

**HIST 7153-3. Seminar: English History, 800–1688.** Prereq., background in English or European history.

**HIST 7183-3. Interdisciplinary Seminar in British Studies.** Introduces students to the methodologies and texts/sources of current work in English literature, history, theatre, art history, and social sciences. Students write a paper based upon the University of Colorado's distinctive research collections in British studies. Prereq., graduate standing. Same as ENGL 7889.

**HIST 7843 (1-3). Independent Study.**

## Europe: Topical

**HIST 3414-3. Seminar in European Intellectual History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3844 (1-3). Independent Study.**

**HIST 4064-3. Problems and Topics in Spanish History, 711–1700.** Examines Spanish history at a time of dynamic change, uncommon achievement, and extraordinary atrocities. Addresses questions of religious co-existence, religious intolerance, imperial expansion, and natural unification, among others. Prereq., HIST 1010 or 1030. Restricted to sophomores/juniors/seniors.

**HIST 4134-3. Elizabeth I and Her Times.** Interdisciplinary course explores different aspects of the reign of Elizabeth I: social and political history; literature; theater; and music. Explores the role and impact of a female ruler on English culture. Restricted to juniors/seniors. Same as ENGL 4583 and THTR 4091.

**HIST 4164-3. History and Literature of Georgian England.** Provides interdisciplinary study of England in one of its most vibrant cultural and historical periods. Topics include politics, religion, family life, and the ways contemporary authors understood their world. Same as ENGL 3164. Approved for arts and sciences core curriculum: historical context.

**HIST 4314-3. History of Science from the Ancients to Sir Isaac Newton.** History of science from pre-Socratics to Isaac Newton, underscoring major intellectual themes in scientific thought and the historical context in which they developed. Prereq., HIST 1010 or 1030. Restricted to sophomores/juniors/seniors.

**HIST 4324-3. History of Modern Science.** Historical and sociological study of scientific institutions and ideas as they interacted with Western culture and society from the 17th through the 20th centuries. Examines controversies in astronomy, geology, genetics, Darwinism, and nuclear science. Prereq., HIST 1020 or 1040. Restricted to sophomores/juniors/seniors.

**HIST 4414-3. European Intellectual History, 1750–1870.** Explores major developments in European thought from the Enlightenment to Nietzsche. Special attention given to the individuals whose ideas have had the greatest influence on modern intellectual history, e.g., Rousseau, Hegel, Herder, Marx, Kierkegaard, Baudelaire, Darwin, and others. Restricted to sophomores/juniors/seniors.

**HIST 4424-3. European Intellectual History, 1870 to Present.** Emphasizes Nietzsche and the youth revolt against middle class society, the literary and artistic avant garde (impressionism to existentialism), the psychoanalytic movement, the European right and left, and post-WWII European thought. Restricted to sophomores/juniors/seniors.

**HIST 4444-3. Topics in Modern European Thought.** Explores a selected theme in European thought since the Enlightenment. Topics vary each term. Restricted to sophomores/juniors/seniors.

**HIST 4544-3. History of Yiddish Culture.** Jews have produced culture in Yiddish, the vernacular language of eastern European Jewry, for 1000 years and the language continues to shape Jewish culture today. In this course, we will look at the literature, film, theater, music, art, sound, and laughter that defined the culture of eastern European Jewry and, in the 20th century, Jews around the world. Recommended prereqs., HIST 1108 or HEBR 2350. Same as JWST 4544.

**HIST 4614-3. Women and Society in Industrial Europe.** Examines impact of industrialization and related social change on women in modern European history. Topics include work, family, sexuality, and women in movements for social and political change. Prereq., HIST 1020 or 1040. Restricted to sophomores/juniors/seniors. Same as WMST 4614.

**HIST 5014-3. Law and Legal History in Early Modern Europe.** Explores use of legal records as a source for writing not only political and economic history, but social and cultural history as well. Traces the historiographic and methodological trajectory of legal history in early modern European countries. Prereq., graduate standing.

**HIST 6414-3. Readings in European Intellectual History.** Prereq., graduate standing or instructor consent.

**HIST 7214-3. Seminar: Economic Development.** Prereq., graduate standing. Same as ECON 8764.

**HIST 7424-3. Research Methods in Medieval/Early Modern European History.** Introduces students to research skills needed to work with historical manuscripts. Students learn to read late medieval/early modern handwriting, explore CU's microfilmed collections of manuscripts, and write a research paper based on the manuscript materials. Prereq., graduate standing or instructor consent.

**HIST 7464-3. Seminar: European Intellectual History.**

**HIST 7844 (1-3). Independent Study.**

## United States: Chronological Periods

**HIST 1015-3. History of the United States to 1865.** Surveys American history from first settlement until end of the Civil War. Also available through correspondence study. Meets MAPS requirement for social science: general and U.S. history. Approved for arts and sciences core curriculum: United States context.

**HIST 1025-3. History of the United States since 1865.** Surveys social, economic, political, and cultural development of the United States from the close of the American Civil War to the present. Also available through correspondence study. Meets MAPS requirement for social science: general and

U.S. history. Approved for arts and sciences core curriculum: United States context.

**HIST 2015-3. The History of Early America.** Examines major themes in the development of colonial societies in North America from the 15th to the early 19th centuries. Explores intercultural relations, economic development, labor systems, religion and society, and family life. Specific course focus may vary. Approved for arts and sciences core curriculum: United States context.

**HIST 2215-3. The Era of the American Revolution.** Explores the foundation of the American republic and promotes an understanding of the social, cultural, and political circumstances that define the era of the American Revolution. Specific course focus may vary. Similar to HIST 4205, 4215. Approved for arts and sciences core curriculum: United States context.

**HIST 3115-3. Seminar in Early American History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3415-3. Seminar in Recent American History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to JR/SR HIST majors.

**HIST 3425-3. The Great Depression: 1929-1945.** The new deal response to the great depression strongly influenced America's politics, its economy, and its culture. Examines the political, economic, and cultural issues that resulted from the great depression and the new deal, 1929-1945. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher.

**HIST 3845 (1-3). Independent Study.**

**HIST 4125-3. British Colonial America, 1580-1756.** Studies settlement and evolution of British Colonial America until the Seven Years' War. Prereqs., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors. Same as HIST 5125.

**HIST 4205-3. The Colonial Wars and the Coming of American Independence, 1739-1776.** Investigates imperial warfare and its effects during the late colonial period, concentrating on the French and Indian War (1754–1763), the disruption of Anglo-American relations, and the origins of the War of American Independence (1775–1783). Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors. Same as HIST 5205. Credit not granted for this course and HIST 2215.

**HIST 4215-3. The Revolutionary War and the Making of the American Republic, 1775-1801.** Investigates the Revolutionary War and its impact on the creation of American political institutions, as well as its cultural, social, and economic effects, from the Battles of Lexington and Concord through the inauguration of Thomas Jefferson. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors. Same as HIST 5215. Credit not granted for this course and HIST 2215.

**HIST 4225-3. The New Nation: America, 1800–1828.** History of the United States from George Washington's inauguration to the election of Andrew Jackson. Deals with the political, social, economic, and cultural currents in the life of postrevolutionary America. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors.

**HIST 4235-3. Jacksonian America.** Focuses on the social and cultural history of the Jacksonian Era. Issues include the transformation of the market economy, slavery, moral reform, Indian removal, changes in ideas about men's and women's natures and roles, western expansion, and political culture. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors.

**HIST 4315-3. Civil War and Reconstruction.** Describes the forces at work in the antebellum period that led to sectional warfare; social, economic, and political changes effected by the war; the American agony of reconstruction; and the long-range results of that difficult era. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors.

**HIST 4415-3. United States History, 1900–1929.** History of the United States during the progressive years, 1900 to 1929, emphasizing social, economic, cultural, and political evolution of the American people and the nation's role in world affairs. Prereq., HIST 1025 or 1045. Restricted to sophomores/juniors/seniors.

**HIST 4425-3. United States History, 1933–1968.** Examines American history, 1933–1968, with attention to domestic and foreign policy issues. Emphasizes

the Great Depression, WW II, the Cold War, the Korean conflict, and the Truman administration's Fair Deal. Restricted to sophomores/juniors/seniors.

**HIST 4445-3. United States since 1968.** Traces political, diplomatic, economic, and social developments in the United States from 1968 to the present. Restricted to sophomores/juniors/seniors.

**HIST 5205-3. The Colonial Wars and the Coming of American Independence, 1739–1776.** Prereq., graduate standing. Same as HIST 4205.

**HIST 5215-3. The Revolutionary War and the Making of the American Republic, 1775–1801.** Prereq., graduate standing. Same as HIST 4215.

**HIST 5845 (1-3). Independent Study.**

**HIST 6115-3. Readings in American Colonial History.** Prereq., graduate standing.

**HIST 7155-3. Seminar: Early American History.**

**HIST 7485-3. Seminar: United States History, 1948-Present.**

## United States: Topical Courses 1

**HIST 2126-3. Modern U.S. Politics and Diplomacy.** Traces the development of contemporary U.S. politics and foreign relations. Analyzes subjects such as the Cold War, the relationship between foreign and domestic politics, the developing meaning of conservatism, liberalism, and radicalism. Explains the impact of race, gender, class, and immigration. Specific course focus may vary. Approved for arts and sciences core curriculum: United States context or contemporary societies.

**HIST 2166-3. The Vietnam Wars.** Traces the causes, course, and outcome of the wars in Vietnam from 1940 until 1975. Explains the successes of the revolutionaries and the failures of the French and Americans. Analyzes the development of Vietnamese nationalism, French colonialism, and U.S. intervention. Similar to HIST 4166. Approved for arts and sciences core curriculum: contemporary societies or United States context.

**HIST 2316-3. History of American Popular Culture.** Traces changes in American society from the Revolution to the present. Focuses on the increasing levels of mediation represented by print, spectacular performance, radio, television, and recorded music. Approved for arts and sciences core curriculum: United States context.

**HIST 2326-3. Issues in American Thought and Culture.** Examines the origins, development, and impacts (social, political, cultural, etc.) of significant ideas and themes in the history of American thought. Topics may include Darwinism, technology, race, success and failure, the social gospel, national mission, and utopia. Approved for arts and science core curriculum: United States context.

**HIST 2516-3. America through Baseball.** Baseball could not have existed without America. Course explains how the game fit into the larger context of social, cultural, economic, and political history from the nineteenth century to the present. Studies the events and people who made baseball the national pastime. Similar to HIST 4556. Approved for arts and sciences core curriculum: United States context.

**HIST 2616-3. Women's History.** Examines the history of women in culture and society over time. Particular emphasis on the roles of women in family, economy, society, and politics. Specific course focus may vary. May be repeated up to 6 total credit hours. Approved for arts and sciences core curriculum: human diversity.

**HIST 2626-3. Gender and Culture.** Examines the construction of gender in a specific culture and society over time. Particular emphasis on the production, maintenance, and critique of sex roles and gender ideologies. Specific course focus may vary. Approved for arts core curriculum: human diversity.

**HIST 2636-3. Women of Color and Activism.** Studies the history of social activism in the United States by women of color, with an emphasis on modes of social activism, issues that have organized specific communities of color, issues that have crossed ethnic/racial boundaries, and the interaction of women from different ethnic/racial groups, including women of color and white women. Recommended prereq., WMST 2000 or 2600. Same as WMST 2400. Approved for arts and sciences core curriculum: United States context.

**HIST 2746-3. Christianity in American History.** Examines the history of religious life in America, with special attention to Protestant and Catholic traditions, as affected by (and affecting) changing historical contexts. Approved for arts and sciences core curriculum: United States context.

**HIST 2866-3. American History and Film.** Teaches students to read films as historical documents, with an emphasis on the 20th century. Focuses on selected moments in U.S. history, studying the historical background and viewing and critiquing relevant films. Approved for arts and sciences core curriculum: United States context.

**HIST 3016-3. Seminar in the History of Gender and Science.** Focuses on the participation of women and the gendering of scientific disciplines in the modern era (especially in the U.S.). Includes the changing definition of science, changing requirements for participation in science, and interactions between ideas about gender and the scientific method. Prereqs., HIST 3020 or an acceptable alternative upper-division writing course (min. grade C-) and History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3116-3. Seminar in American Diplomatic History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3416-3. Seminar in American Society and Thought.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3516-3. American Culture and Reform, 1880–1920.** Addresses the issues of reform, religion, and culture that emerged as a 19th century world view confronted a 20th century America. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to HIST majors.

**HIST 3616-3. Seminar in Women's History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3656-3. History of Women in Progressive Social Movements.** Explores women's involvement in the United States and international peace movements, including feminist and civil rights movements of the 19th and 20th centuries. Students learn research methods by using a variety of primary and secondary sources and writing an original research paper. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.00 or higher. Restricted to junior/senior HIST majors. Same as WMST 3656.

**HIST 3846 (1-3). Independent Study.**

**HIST 4016-3. African American History, 1619–1865.** Explores the history of Africans in America from the first arrivals to emancipation, and their role in the social, cultural, economic, and political evolution of the United States. Prereq., HIST 1015 or 1025 or 1035 or 1045. Restricted to sophomores/juniors/seniors.

**HIST 4116-3. U.S. Diplomatic History, 1865–1939.** Traces the rise of the United States to world power. Explores the interactions of expansionist and isolationist impulses with politics, ideology, culture, and economics. Restricted to sophomores/juniors/seniors.

**HIST 4126-3. U.S. Diplomatic History since 1940.** Traces the development of the United States as a superpower. Special attention is paid to the way in which foreign policy was created and the relationship between foreign and domestic affairs. Restricted to sophomores/juniors/seniors.

**HIST 4146-3. Military History.** Examines America's national defense and war efforts from the Spanish American War to the present, emphasizing causes and consequences of modern conflicts, and the impact of military activities on American society. Restricted to juniors/seniors.

**HIST 4166-3. The War in Vietnam and Its Legacy.** Traces diplomatic, military, cultural, social, and political history of the war in Vietnam from the beginning of U.S. involvement in 1950 to its aftermath in the 1980s. Credit not granted for this course and HIST 2166.

**HIST 4316-3. The Origins of American Culture, 1600–1830.** Traces the development of American culture from its colonial roots to the early decades of the 19th century. Focuses on regional differences in the colonial period, the cre-

ation of a new cultural synthesis during the Revolution, and the cultural implications of the Revolutionary legacy. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors.

**HIST 4326-3. Health and Disease in the United States.** Examines health care and disease patterns in the United States, from the colonial period through the 1980s. Topics include biomedicine and alternative therapies, changing ideas about health and disease, the patient perspective, and financing health care. Prereq., HIST 1025 or 1045. Restricted to sophomores/juniors/seniors.

**HIST 4336-3. 19th Century American Intellectual History.** Examines developing intellectual traditions in their social and political contexts. Addresses democracy, religion, transcendentalism, women, race, union or disunion, the Darwinian revolution, and literary realism and naturalism. Restricted to sophomores/juniors/seniors.

**HIST 4346-3. 20th Century American Intellectual History.** Addresses the impacts of political, social, and economic developments on ideas about democracy, science, race, gender, faith, the supposed mission of America, and the role of intellectuals in society. Restricted to sophomores/juniors/seniors. Same as ETHN 4344.

**HIST 4516-3. U.S. Society in the 19th Century.** Concerned with the American family and community in the changing social environments of the 19th century. Examines families of different ethnic and class backgrounds, observing how they are changed by new economic conditions, reform, or new political institutions. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors.

**HIST 4526-3. U.S. Society in the 20th Century.** Primarily concerned with family roles and community values, and how they are altered by economic, demographic, and intellectual changes during the 20th century. Some of the more important themes are acculturation, the idea of success, reform, and the changing structure of opportunity. Prereq., HIST 1025 or 1045. Restricted to sophomores/juniors/seniors.

**HIST 4556-3. America through Baseball.** Baseball serves as a window to view the American experience. Covers U.S. history since 1830, addressing the major topics that reflect on American society, such as professionalization, labor management conflict, race, gender, culture, politics, economics, and diplomacy. Prereq., HIST 1025 or 1045. Recommended prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors. Credit not granted for this course and HIST 2516.

**HIST 4566-3. 20th Century United States Labor History.** Traces development of an industrial labor force in the United States and focuses on gender, ethnicity, and class. Three major themes covered are transformation of the organization of work, everyday lives of workers, and the role of government. Prereq., HIST 1025 or 1045.

**HIST 4616-3. History of Women in the United States to 1890.** Examines female experience in the United States from 17th century European colonization to 19th century settlement of the frontier. Emphasizes comparison between classes, regions, and racial/ethnic groups. Women's writings provide the basis for discussions of private and public roles, definitions of femininity, interpersonal relationships, and struggles for survival and self-expression. Same as WMST 4616. Prereq., junior or senior standing.

**HIST 4626-3. History of Women in the United States since 1890.** Examines what it means to be female in 20th century United States, emphasizing comparison between classes and racial/ethnic groups. Women's writings serve as the basis for discussions of private and public roles, definitions of womanhood, interpersonal relationships, and struggles for autonomy and equality. Prereq., junior or senior standing. Same as WMST 4626.

**HIST 4636-3. Lesbian and Gay History: Culture, Politics, and Social Change in the United States.** Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the United States through investigation of lesbian/gay identity formation, community development, politics, and queer cultural resistance. Prereq., HIST 1015 or 1025 or 1035 or 1045 or WMST 2000. Same as HIST 5636 and WMST 4636.

**HIST 4726-3. U.S. Immigration History.** Focuses on economic, social, and cultural history of immigration, return migration, and permanent settlement in the U.S. during the 19th and 20th centuries. Examines the ways in which race, class, ethnicity, gender, and sexuality shape social relations. Prereq., HIST 1015 or 1025 or 1035 or 1045. Restricted to junior/senior HIST or ETHN majors.

**HIST 5106-3. Graduate Colloquium in United States History.** Students gain an acquaintance with major works in the field and discuss current issues of interpretation and methodology. May be repeated up to 9 total credit hours. Prereq., graduate standing.

**HIST 5636-3. Lesbian and Gay History: Culture, Politics, and Social Change in the United States.** Restricted to graduate students. Same as HIST 4636 and WMST 4636.

**HIST 5846 (1-3). Independent Study.**

**HIST 6116-3. Readings in American Diplomatic History.** Prereq., undergraduate work in American history.

**HIST 6146-3. Readings in U.S. Political History.** Explores the history of politics in the U.S., with an emphasis on the period since 1865. Key themes include the relations between state and society, the origins and nature of social movements, and the role played by political culture. Prereq., graduate standing.

**HIST 6326-3. Readings in United States Intellectual History.** Examines the history of ideas and the social history of intellectuals in American society during the 19th and 20th centuries. Stresses social and political dimensions and the changing cultural and institutional contexts of intellectual discourse. Prereq., graduate standing or instructor consent.

**HIST 6526-3. Readings in U.S. Social History, 1880–1940.** Prereq., graduate standing or instructor consent.

**HIST 6536-3. Readings in 20th Century U.S. Labor History.** Prereq., graduate standing.

**HIST 6546-3. Readings in Cultural History and Theory.** Introduces standard works and recent developments in cultural history. Explores structuralism and post-structuralism, semiotics, social construction, relativism, hegemony, and the idea of postmodernity in the uses of culture as an historical category. Prereq., graduate standing or instructor consent.

**HIST 6556-3. Readings in U.S. History, the Depression and World War II.** May be repeated up to 6 total credit hours.

**HIST 6616-3. Readings in the History of American Women.**

**HIST 6756-3. Race and Nationalism.** Focuses on analytical, ideological, cultural, and political tensions between understandings of race and nationalism. Readings are interdisciplinary, but students identify and analyze tensions between race and nationalism at particular historical moments. Prereq., graduate standing or instructor consent.

**HIST 7156-3. Seminar: American Diplomatic History.** Prereq., graduate standing.

**HIST 7326-3. Seminar: U.S. Intellectual History.** Prereq., graduate standing.

**HIST 7556-3. Seminar: American Society and Thought.** Prereq., graduate standing.

**HIST 7566-3. Research Seminar in Labor History.** Explores various issues in U.S. labor history through readings and research projects. Most of the readings are taken from writings on U.S. labor history. Special attention is given to women, immigration, and regional patterns. Research skills emphasized. Prereq., HIST 6536 or instructor consent.

**HIST 7656-3. Seminar: Women's History.** Prereq., one 6000-level readings course in women's history.

**HIST 7846 (1-3). Independent Study.**

## United States: Topical Courses 2

**HIST 2117-3. History of Colorado.** Emphasizes historical variety and ethnic diversity of Colorado. Along with traditional themes in Colorado history, such as the gold rush, attention is given to Indian and Hispanic activity and culture. Also available through correspondence study. Approved for arts and sciences core curriculum: United States context.

**HIST 2227-3. History of the American Southwest.** Covers major observations and criticisms central in shaping the history of the southwest. Approved for arts and sciences core curriculum: United States context.



**HIST 2437-3. African American History.** Surveys African American history. Studies, interprets, and analyzes major problems, issues, and trends affecting African Americans from about 1600 to the present. Same as ETHN 2432. Approved for arts and sciences core curriculum: human diversity or U.S. context.

**HIST 2537-3. Chicano History.** Examines social, economic, political, and cultural history of Americans of Mexican descent and focuses on the heritage of Mexican society and thought, the Mexican-U.S. war, Mexican American society and thought, and the Chicano movement of the 1960s. Same as ETHN 2536. Approved for arts and sciences core curriculum: human diversity or U.S. context.

**HIST 3317-3. Seminar in the American West.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3417-3. Seminar in African American History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a HIST GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3847 (1-3). Independent Study.**

**HIST 4217-3. The American West in the 19th Century.** Explores cultural, social, and political interaction in the American West during the 19th century. Themes include environmental change; conflict and syncretism across race, class, and gender lines; and mythic images, and their relationship to the "real" West. Prereq., HIST 1015 or 1025 or 1035 or 1045.

**HIST 4227-3. The American West in the 20th Century.** Explores cultural, social, and political interaction in the American West during the 20th century. Themes include popular culture, state-federal relationships, environmental change, urbanization, immigration, and cultural formation. Prereq., HIST 1015 or 1025 or 1035 or 1045. Restricted to sophomores/juniors/seniors.

**HIST 4417-3. Environmental History of North America.** Examines how people of North America, from precolonial times to the present, organized their lives within the ecological systems of the area, how they conceived of their natural world, and how they reshaped their environment according to their human needs. Prereqs., HIST 1015 or 1025 or 1035 or 1045. Restricted to sophomores/juniors/seniors.

**HIST 4617-3. Native North American History I: Human Settlement to 1815.** Explores the establishment and development of human societies in North America prior to 1492; the varied experiences of contact; the crises, opportunities, and transformations that attended colonialism; Indians and the inter-imperial contests of the eighteenth century; and the struggles of native peoples confronting the newly-independent United States. Prereq., HIST 1015 or 1035. Restricted to sophomores/juniors/seniors.

**HIST 4627-3. Native North American History II: 1815 to Present.** Explores the longevity and continuity of human history in North America by discussing pre-European social and cultural developments. By examining ways in which Indian societies west of the Mississippi River responded to Euro-Americans, the Indians' role in western North American history is demonstrated. Restricted to sophomores/juniors/seniors.

**HIST 4717-3. Chinese American History.** Examines Chinese American history from 1848 to the present day within context of socioeconomic and political developments in China and the United States. Topics include the Chinese diaspora, immigration to the United States, participation in the economy, the exclusion movement, community development, women, and family. Prereqs., AAST 1015, or HIST/AAST 2717, or instructor consent. Restricted to sophomores/juniors/seniors.

**HIST 5847 (1-3). Independent Study.**

**HIST 6317-3. Readings in the American West.** Prereq., graduate standing.

**HIST 6417-3. Readings in Environmental History.** Offers historical perspective on the complex and interdependent relationship between human social and cultural institutions and the natural world. Considers interdisciplinary methodologies incorporating history, biology, geography, law, and other disciplines. Same as EPOB 6410.

**HIST 6427-3. Readings in African American History.** Introduces classic and recent scholarship, and critical issues in African American history, from slavery to the present. Prereq., graduate standing.

**HIST 7257-3. Seminar: History of the American Frontier.** Prereq., graduate standing.

**HIST 7847 (1-3). Independent Study.**

## World Areas: Specific Regions

**HIST 1038-3. Introduction to Latin American History.** Broad survey of the history of that part of the Western Hemisphere now known as Latin America. Chronologically covers prehistorical period to present. Provides an understanding of the relationship of Latin America to the Western world, and is concerned with Latin American social and political development. Approved for arts and sciences core curriculum: historical context.

**HIST 1108-3. Introduction to Jewish History.** Surveys Jewish history from the earliest times to the present. Includes biblical history; Judaism in late antiquity, medieval, and early modern times; and special emphasis on the 19th century to the present, including American Judaism, the Holocaust, anti-Semitism, Zionism, and Israel. Same as GSLL 1108 and JWST 1108. Approved for arts and sciences core curriculum: historical context.

**HIST 1208-3. Sub-Saharan Africa to 1800.** Introduces the peoples of Africa south of the Sahara and some major developments in the region up to A.D. 1800. Approved for arts and sciences core curriculum: historical context.

**HIST 1308-3. Introduction to Middle Eastern History.** Interdisciplinary course that focuses on medieval and modern history of the Middle East (A.D. 600 to the present). Introduces the Islamic civilization of the Middle East and the historical evolution of the region from the traditional into the modern eras. Covers social patterns, economic life, and intellectual trends, as well as political development. Approved for arts and sciences core curriculum: historical context.

**HIST 1408-3. Introduction to South Asian History.** Introduction to South Asian History is a survey of the history of the South Asian subcontinent from prehistoric times to the present. Lectures and readings deal with political, economic, social, and intellectual history. Approved for arts and sciences core curriculum: historical context.

**HIST 1608-3. Introduction to Chinese History.** Introduces students to Chinese civilization and to its historical evolution, from Neolithic period to present. Focuses on social patterns, economic structure, intellectual trends, and political developments. Approved for arts and sciences core curriculum: historical context.

**HIST 1708-3. Introduction to Japanese History.** A broad interdisciplinary survey of the history of Japan from earliest times to the 20th century. Explores the development of political institutions, social structures, cultural and religious life, economic development, and foreign relations in an historical perspective. Approved for arts and sciences core curriculum: historical context.

**HIST 3018-3. Seminar in Latin American History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3218-3. Peoples and Cultures of West Africa.** Deals with the history and anthropology of selected west African societies in the period before the imposition of European colonial rule. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors. Same as ANTH 3218.

**HIST 3328-3. Seminar in Middle Eastern History.** Examines selected issues in modern Middle Eastern history. Check with the department concerning the specific subject of the seminar. Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to junior/senior HIST majors.

**HIST 3628-3. Seminar in Recent Chinese History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3718-3. Seminar in Japanese History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to HIST majors.

**HIST 3848 (1-3). Independent Study.**

**HIST 4118-3. History of Mexico to 1821.** Studies Mexican history beginning with roots and evolution of pre-Columbian civilizations and concluding with

the events of Mexican independence in 1821. Emphasizes society and culture of the Aztecs and Mayans, the Spanish conquest of Mexico, and the colonial regime of New Spain. Restricted to sophomores/juniors/seniors.

**HIST 4128-3. The Emergence of Modern Mexico.** Study of Mexican history continues with the establishment of independence in 1821. Examines the upheavals of the Mexican Revolution and culminates with recent events in Mexico. Restricted to sophomores/juniors/seniors. Same as ETHN 4126 and HIST 5128.

**HIST 4138-3. Southwest Borderlands to 1900.** Explores the history of the region that would become the American Southwest to 1900. Focusing on themes of novelty, conflict, and adaptation, class explores how changes in ecology, demography, economy, and technology transformed relations between native peoples, Spaniards, and Mexicans. Concludes with unit on causes, events, and consequences of the U.S.-Mexican War. Restricted to sophomores/juniors/seniors.

**HIST 4218-3. States and Societies of West Africa to 1900.** Examines the history of West Africa from the earliest times to the 19th century. Prereq., junior standing.

**HIST 4238-3. History of Southern Africa.** Examines the history of southern Africa from the earliest hunters, herders and farmers through to the present. One of the chief mediums of analysis is the novel. Short background readings and lectures cover southern Africa's history, and class discussions of novels are layered over these basics. Themes of study include: gender, migration, imperialism, religion, disease, resistance, race, ethnicity, and empire, among others. Prereq., HIST 1208.

**HIST 4248-3. Africa in the 19th Century.** Juxtaposes an increasing process of indigenous state-building with increasing European presence. Restricted to sophomores/juniors/seniors.

**HIST 4258-3. Africa under European Colonial Rule.** Focuses on the political, economic, and social dimensions of colonialism, as well as African nationalism and decolonization. Restricted to sophomores/juniors/seniors.

**HIST 4318-3. The Medieval Middle East, A.D. 500–1600.** Examines the history of the Middle East from 600 to the early modern period. Attention divided equally between political and economic history, and the arts and sciences characteristic of the civilization of Islam (theology, philosophy, mysticism, etc.). Restricted to sophomores/juniors/seniors.

**HIST 4328-3. The Modern Middle East, 1600 to the Present.** Primarily from 1800 to the present. Attention divided equally between the region's political history and international relations and its patterns of economic, social, and cultural modernization in the main countries. Prereq., HIST 1308. Restricted to sophomores/juniors/seniors. Same as HIST 5328.

**HIST 4348-3. Topics in Jewish History.** Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester. Consult the on-line Schedule Planner for specific topics. May be repeated up to 6 total credit hours within the degree. Restricted to sophomores/juniors/seniors. Same as JWST 4348.

**HIST 4368-3. History and Society of Modern Arabia, 1800–2001.** Examines the history, politics, and society of the countries of the Arabian peninsula (modern day Saudi Arabia, Oman, Yemen, Bahrain, UAE, and Qatar) from 1800 to the present. Covers state formation, Islamic revivalist movements of Muhammad Abd al-Wahhab and Muhammad Ali al-Shawkani, Ottoman and British imperialism, the rise of the oil economy, and the recent development of liberal and Islamist opposition movements. Concludes by examining the rise of Usamah b. Ladin and al-Qaeda in the contexts of Arabian history and the Indian ocean. Prereq., HIST 1308. Restricted to sophomores/juniors/seniors.

**HIST 4528-3. Islam in South and Southeast Asia (1000 to the Present).** Examines the history of Muslim societies in south and southeast Asia from 1000 to the present. Focuses on themes such as the rise of Islamic empires in South Asia, Sufism, trade and the spread of Islam in Southeast Asia, the rise or Muslim nationalism and religious fundamentalism, and the impact of modernization and globalization Muslims of the region. Recommended prereq., six hours of history credit.

**HIST 4538-3. History of Modern India.** Examines the history of India from the British conquest of India in the late 18th century to independence in 1947. Emphasizes the impact of British rule on the political, economic, and social

development of modern India. Recommended prereq., at least 6 hours of history credit. Restricted to sophomores/juniors/seniors. Same as HIST 5538.

**HIST 4548-3. Women in Modern India.** Examines the history of women and gender in India from the late eighteenth century to the present. Explores topics such as the changing legal status of women in the colonial and postcolonial period, marriage, domesticity and patriarchy, and women's education and participation in anti-colonial and postcolonial politics, women, work, and the environment, violence against women, and women and globalization. Prereq., any 1000 level HIST course. Recommended prereq., HIST 1408. Same as HIST 5548.

**HIST 4558-3. Modern Indian Intellectual History.** Focuses on the nature and evolution of thought in modern India in the light of the encounter between pre-modern Indian and modern western intellectual traditions in colonial and postcolonial India. Examines themes such as orientalism, nationalism, Hindu and Muslim nationalism, humanism, non-violence, and postcolonialism

**HIST 4618-3. Traditional China.** Examines major traditions in philosophy, art, politics, society, and economy of China during the premodern period. Prereq., HIST 1608 or EALC 1011. Restricted to sophomores/juniors/seniors.

**HIST 4628-3. Modern China.** Examines China from 1750 to 1949. Focuses on such issues as the influence of imperialism, the emergence of nationalism, and the meaning of revolution. Restricted to sophomores/juniors/seniors. Same as HIST 5628.

**HIST 4638-3. Contemporary China.** Examines the history of the People's Republic of China from 1949 to the present. Focuses on such issues as the nature of Maoism, foreign policy, political campaigns such as the Cultural Revolution and the Democracy movement, and recent economic developmental efforts. Restricted to sophomores/juniors/seniors.

**HIST 4648-3. History of Modern Chinese Intellectual Thought.** Examines major intellectual movements in modern China from Ch'ing neo-Confucianism, empiricism, and nationalism to Chinese communism. Prereq., HIST 1608.

**HIST 4658-3. China and Islam from the 7th Century to the 20th Century.** This course traces how "Muslims in China" transformed themselves into "Chinese Muslims" while at once accommodating and conflicting with Chinese states and people throughout history until the present time. Recommended prereq., HIST 1608.

**HIST 4718-3. Ancient, Classical, and Medieval Japanese History.** Begins with the prehistoric and protohistoric periods. Explores the development of Japan's classical age and traces the rise and attenuation of an elite warrior government. Restricted to juniors and seniors.

**HIST 4728-3. Modern Japanese History.** Begins with early modern Japan, proceeds through the era of rapid modernization after the Meiji Restoration in the mid-19th century, and concludes with Japan's gradual descent into prolonged war, first with China and then in the Pacific. Restricted to juniors and seniors.

**HIST 4738-3. History of Early Modern Japan (1590–1868).** Covers the history of early modern Japan (1590-1868). Explores the political, social, cultural, and economic context of Japan's history from the era of Warring States through the rise and fall of the Tokugawa military government (Shogunate). Restricted to juniors and seniors. Same as HIST 5738.

**HIST 5128-3. The Emergence of Modern Mexico.** Same as HIST 4128.

**HIST 5248-3. History of Anglo-American Criminal Justice.** Explores the social, cultural, and legal history of Anglo-American criminal justice from the 17th to the 20th centuries. Also examines tensions between various methods that historians employ to study crime and law.

**HIST 5328-3. The Modern Middle East, 1600 to the Present.** Prereq., graduate standing. Same as HIST 4328.

**HIST 5538-3. History of Modern India.** Same as HIST 4538.

**HIST 5548-3. Women in Modern India.** Same as HIST 4548.

**HIST 5628-3. Modern China.** Prereq., graduate standing. Same as HIST 4628.

**HIST 5738-3. History of Early Modern Japan (1590-1868).** Same as HIST 4738.

**HIST 5848 (1-3). Independent Study.**

**HIST 6628-3. Reading in South Asian History.** Introduces major topics and themes in South Asian history. Reviews central theories relating to topics such as religion, nationalism, law, gender, colonialism, and literature.

**HIST 7848 (1-3). Independent Study.**

## World Areas: Comprehensive and General

**HIST 2319-3. Introduction to Islam.** Covers early history of Islam, its culture, and contribution to human civilization. Specific topics include beginnings of Islam (including split between Shii and Sunni Muslims); the Qu'ran; overview of the faith, belief, and practice; the spread of Islam; sects (Sufi mysticism, etc.); Muslim contributions to the global intellectual traditions; and contemporary Islam. Approved for arts and sciences core curriculum: historical context.

**HIST 2629-3. China in World History.** Examines the multiple connections between Chinese history and other parts of the world over the course of China's long history. Approved for arts and sciences core curriculum: historical context.

**HIST 3019-3. Seminar in Asian and African History.** Prereq., WRTG 3020 or an acceptable alternative upper-division writing course (min. grade C-) and a History GPA of 2.0 or higher. Restricted to junior/senior HIST majors.

**HIST 3849 (1-3). Independent Study.**

**HIST 4109-3. World War II in Asia and the Pacific.** For Asia, World War II began with the Mukden Incident (1931), resulting in the Japanese domination of Manchuria and leading to a full-scale war between China and Japan in 1937. Only after the Japanese attacked the U.S. Pacific fleet at Pearl Harbor four years later did the United States enter the war. Discusses the various socioeconomic and political factors leading to the war in Asia, examines the nature of the conflict on the Asian mainland and in the Pacific, and assesses legacy of the war on all those involved. Restricted to sophomores/juniors/seniors.

**HIST 4119-3. Latin American Revolutions.** Examines the origins, development and continuing influence of 20th-century Latin American revolutionary movements, with a focus on placing these struggles in comparative historical context. Explores various approaches to revolution and the general role of left political formations in Latin America. Examples will be drawn from various Latin American countries, including Mexico, Guatemala, Cuba, Chile and Nicaragua. Prereq., HIST 1038. Restricted to sophomores/juniors/seniors. Same as HIST 5119.

**HIST 4259-3. African Liberation Struggles: A Comparative History.** Highlights the complexity of African decolonization by focusing on the various voices that contend for space as Africa begins its struggle for liberation. Examines the interrelationship between African colonizers and their colonial administrations, the liberation ideologies emanating from African Diaspora: Pan-Africanism, Garveyism, Negritude and Jamesian socialism, and African nationalist movements and leaders. Restricted to sophomores/juniors/seniors.

**HIST 4329-3. Islam in the Modern World: Revivalism, Modernism, and Fundamentalism, 1800–2001.** Examines the more important movements of reform in Muslim world (including Africa, the Middle East, and India) from the 18th century to the present, and their origins and intellectual import. Due to the trans-regional nature of this broad movement of reform, we will pay particular attention to how these movements related to local political, economic, and social contexts, and how they, in turn, moved across larger networks of oceanic commerce and trade. The course concludes with extended case studies of Islamic reformism in modern Egypt and India, and their ultimate influence on the politics of contemporary Islamist movements, especially the intellectual position of Ussama b. Ladin. Prereq., HIST 1308. Restricted to sophomores/juniors/seniors.

**HIST 4339-3. Borderlands of Empire.** Presents the borderlands of the British empire as central rather than peripheral, and examines their development through imperial expansion, consolidation, and decolonialization. Topics include domination, resistance, and negotiation in areas such as India, Afghanistan, the Palestine Mandate, and Sudan. Aims for students to acquire skills in comparative history and to develop a better understanding of the roots of contemporary conflicts. Restricted to sophomores/juniors/seniors. Same as HIST 5339.

**HIST 4619-3. Women in Asian History.** Considers major issues in the history of Asian women in the 18th, 19th, and 20th centuries. Focuses on gender roles in

Asian family, state, and religious systems. Restricted to sophomores/juniors/seniors. Same as WMST 4619 and HIST 5619.

**HIST 5119-3. Latin American Revolutions.** Same as HIST 4119.

**HIST 5129-3. Colloquium in Modern Asian History.** Introduces major topics and themes in Asian history. Analyzes readings relating to topics such as imperialism, cultural agency, gender, race, nationalism, decolonization, and revolution.

**HIST 5339-3. Borderlands of Empire.** Same as HIST 4339. Same as HIST 4339.

**HIST 5619-3. Women in Asian History.** Same as HIST 4619.

**HIST 5849 (1-3). Independent Study.**

**HIST 6019-3. Readings in World History.** Prereq., graduate standing.

**HIST 6329-3. Readings in Comparative Ethnohistory.** Prereq., graduate standing.

**HIST 7119-3. Graduate Research Seminar in Asian History.** Prepares students for research in historical documents in Asian languages in order to write a substantial original research paper based on primary and secondary source materials. Prereq., graduate standing and background in Asian history.

**HIST 7849 (1-3). Independent Study.**

## Honors

**HONR 1001-1. Honors Coseminar.** Honors coseminars are designed to combine an honors seminar experience with the shared experience of an organized lecture course. Designed typically for 10–15 students, coseminars are taken for an additional 1 credit hour. Coseminars provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity. May be repeated up to 4 total credit hours.

**HONR 1810-3. Honors Diversity Seminar.** Students will develop an appreciation for, and experience with, diverse perspectives. In particular this includes: racial/ethnic, gender, sexual orientation, and class perspectives, for constructing knowledge as they proceed through their undergraduate studies. Three themes provide the framework for the course: education for the next century, the 21st century citizen, and the modern individual in a diverse society. Topics explored include privilege, stigmatization, targeted and nontargeted grouping, and oppression. Engaging in independent research and experiential, empathetic experiences is required. Approved for arts and sciences core curriculum: human diversity.

**HONR 2250-3. Ethics of Ambition.** Through selected readings in classical literature on ethics and through more contemporary readings and films, examines critical ethical issues relating to the competition of ambitions and the alternative styles of choosing between courses of action in a dangerous world. Uses biographies of those whose lives illustrate both the complexities of the struggles and the profundity of possibilities. Considers the unconscious metaphors of national visions and ambitions, the competing ethics of ends and means, the conflicting ambitions in a pluralistic society, and the transcendent ambitions of visionaries. Same as FARR 2660. Approved for arts and sciences core curriculum: ideals and values.

**HONR 2251-3. Introduction to the Bible.** Studies the major works, figures, and genres of the Bible and attempts to understand what they meant to their own time and why they became so important to Western civilization and contemporary America. Approved for arts and sciences core curriculum: historical content.

**HONR 2500-3. Open Topics.** Variety of new courses at the 2000 level. See honors program announcements for specific contents. May be repeated up to 6 total credit hours. Prereq., GPA 3.30 or higher.

**HONR 2610-1. Leadership Practicum: HRAP Flock Leaders.** Required for students who are selected as flock leaders for the Honors Residential Academic Program. Teaches skills and techniques to enable them to lead a small group in the unique environment of a residential honors program. May be repeated up to 2 total credit hours. Prereq., consent of Honors Residential Academic Program associate director.

**HONR 2860-3. The Figure of Socrates.** Investigates why Socrates intrigued great writers like Aristophanes, Plato, Xenophon, and Aristotle and why, through his life and execution by the Athenian democracy, he still influences Western ethics, politics, and education and is central to cultural literacy. Approved for arts and sciences core curriculum: literature and the arts.

**HONR 3001-1. Honors Coseminar.** Honors coseminars are designed to combine an honors seminar experience with the shared experience of a lecture course. Designed typically for 10-15 students, coseminars are taken either for an additional 1 credit hour or in place of a recitation. Coseminars are designed to provide honors students with an opportunity to extend their common experience in the course lecture into an enriched interactive, critical thinking opportunity.

**HONR 3004-3. Women in Education.** Honors women in education and their legacy. Introduces women educators, beginning in the late 19th century, whose significant theories of education and work in teaching have had an impact on all of our lives, in history, and in society. Explores the educational theories and methods of several representative women educators and analyzes them through an investigation of their professional and personal lives. Same as WMST 3004. Approved for arts and sciences core curriculum: human diversity.

**HONR 3056-3. Experience of Learning.** Major historical, psychological, philosophical and personal perspectives on education in general and university education in particular will be developed. Participants will be encouraged to consider how the issues discussed and the ideas developed in the seminar bear on the choices they face in planning their own educations.

**HONR 3220-3. Advanced Honors Writing Workshop.** Intensive practice of expository writing skills, particularly argumentation in longer forms. Course includes extensive practice in researching secondary sources, synthesizing large bodies of information, structuring cogent arguments for diverse sources, etc. Restricted for juniors/seniors or instructor consent required. Approved for arts and sciences core curriculum: written communication.

**HONR 3270-3. Journey Motif in Women's Literature.** Investigates the application of the theme of the journey to developmental narratives by analyzing modern British and American writings by women. Applies methods from psychology, feminist studies, gay studies, cultural studies to concepts of development, regression, progress, escape.

**HONR 3560-3. Science and Mysticism.** Has modern science proven or validated the mystical religious experience? Or does a basic conflict remain between these diverse human endeavors? The similarities and differences between science and mysticism will be investigated through readings, discussions and practical, experiential exercises. Discussions and exercises will be designed to encourage both an intellectual and a non-intellectual understanding of the course material.

**HONR3810-3. Privilege and Modern Social Construction.** This course examines social constructions that lead to productive interactions between and among American social communities. Using case studies and humanistic accounts, students analyze the lived experiences of a unique group or successful citizens who routinely evidence productive practices of multicultural engagement. Through interactions with policymakers and community practitioners, students design and enact activities that allow them to reconstruct their personal patterns of privilege practices of their peer groups in various settings. Prereq., HONR 1810 or demonstrated academic study of race, class, and gender.

**HONR 4000-3. Open Topics.** Variety of new courses at the 4000 level, see Honors Program announcements for specific contents. May be repeated up to 6 total credit hours. Restricted to juniors/seniors or instructor consent required.

**HONR 4025-3. Heroines and Heroic Tradition.** Given recent controversies about the roles of women in power, this course re-evaluates heroic traditions as the stories that ground our sense of public endeavor. What do we mean by heroic? What is a heroine? Are heroines different from heroes? Approved for arts and sciences core curriculum: human diversity.

**HONR 4055-3. Discourse Analysis and Cultural Criticism.** Discourse analysis critically investigates the founding assumptions by which systems of meaning operate. Its practice is aimed at a rigorous, systematic analysis of both specific cultural issues and the dynamics by which structures of meaning may be maintained or transformed. Coreq., HONR 4056.

**HONR 4056 (1-3). Service Practicum: Discourse Analysis and Cultural Criticism.** Help communities in need, with credit hours varying according to time commitment. The practicum provides experiential and intellectual understanding of the discourses and dynamics that maintain major cultural hierarchies of values and of resource distribution. Coreq., HONR 4055.

**HONR 4959-3. Honors Thesis.** May be repeated up to 6 total credit hours. Requires approval of Honors Program.

## Humanities

**HUMN 1010-6. Introduction to Humanities 1.** Six meetings a week (three discussion classes and three lecture-demonstrations in art and music). Provides an analytical and comparative study of works in literature, music, and visual arts from Aegean to Baroque eras. Emphasizes structure, content, and style in specific examples. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**HUMN 1020-6. Introduction to Humanities 2.** Six meetings a week (three discussion classes and three lecture-demonstrations in art and music). Examines from Baroque to contemporary styles in literature, music, and visual arts. Emphasizes the cultural context in which art was created. Approved for arts and sciences core curriculum: historical context or literature and the arts.

**HUMN 1701-3. Nature and Environment in German Literature and Thought.** Critically examines titles in German literature and thought. Nature and environment are used to explore alienation, artistic inspiration, nihilism, exploitation, sexuality, rural versus urban, meaning of the earth, cultural renewal, identity and gender. This "green" survey of German classics spans Romanticism's conception of nature as unconscious spirit to the politics and values of contemporary Germany's Green party. Same as GRMN 1701. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 2000-3. Methods and Approaches to the Humanities.** Provides a transition from the introductory courses to the upper-division courses. Introduces the various technical methods and topics encountered in the department's comparative, interdisciplinary upper-division courses, including cultural studies, rhetoric, translation, hermeneutics, word/image studies, etc. Prereq., HUMN 1010 or 1020. Restricted to HUMN majors.

**HUMN 2100-3. Arts, Culture, and Media.** Promotes a better understanding of fundamental aesthetic and cultural issues by exploring competing definitions of art and culture. Sharpens critical and analytical abilities by asking students to read and compare different theories about arts, culture, media, and identity, and then to apply and assess those theories in relation to a selection of visual and verbal texts from a range of cultural and linguistic traditions. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 2145-3. African America in the Arts.** Introduces interrelationships in the arts of African Americans and the African American contribution to American culture as a whole. Credit not granted for this course and HUMN 3145. Approved for arts and sciences core curriculum: human diversity or U.S. context.

**HUMN 2601-3. Kafka and the Kafkaesque.** Exposes the students to a wide selection of Kafka's literary output and aims to define the meaning of the Kafkaesque, by looking not only for traces of Kafka's influence in the verbal and visual arts, but also for traces left in Kafka's own work by his precursors in the literary tradition. Taught in English. Same as GRMN 2601. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 3015-3. Jung, Film, and Literature.** The basic themes of C. G. Jung's archetypal psychology (shadow, anima/animus, character typology, and individuation) are studied and applied as tools of critical analysis to selected films and literary texts of the modern period. Prereqs., humanities major, or Farrand student and instructor consent. Same as FILM 3022.

**HUMN 3092-3. Studies in Humanities.** Students should check with the department for specific semester topics. May be repeated up to 12 total credit hours, provided the topics vary. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 3093-3. Topics in Humanities.** Students should check with the department for specific semester offerings. May be repeated up to 12 total credit hours, provided the topics vary. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 3104-3. Film Criticism and Theory.** Surveys the range and function of film criticism, introduces major positions and concepts of film theory, and focuses on students' abilities to write about film. Prereq., FILM 1502. Same as FILM 3104.

**HUMN 3210-3. Narrative.** Explores the nature of sacred and secular narrative in literature, film, and the visual arts. Prereq., HUMN 2000 or junior/senior standing. Formerly HUMN 4013.

**HUMN 3211-3. The Craft of Mystery.** Explores examples of and theories about the formation and growth of the genre of detective fiction, especially in the late 19th and early 20th centuries. Explores the social conditions of the times in which the texts were written and the possible resulting influences on style. Compares the texts and theories to examples from other genres and time periods. Prereqs., HUMN 2000 or junior/senior standing.

**HUMN 3220-3. Epic.** Comparative and interdisciplinary study of the figure of the hero and the concept of fate in the epic tradition and the modern novel. Explores literary, religious, philosophical, and ethical issues. Prereq., HUMN 2000 or junior/senior standing. Formerly HUMN 4023.

**HUMN 3230-3. Comedy.** Offers an interdisciplinary approach to comedy, examining art, music, literature, and film from different periods. Comic theory interlaced with the study of particular works. Prereq., HUMN 2000 or junior/senior standing. Formerly HUMN 3033.

**HUMN 3240-3. Tragedy.** Studies some of the great tragic works of art, music, and literature from the Greeks to the 20th century. Tragic theory is invoked as an aid to interpretation. Prereq., HUMN 2000 or junior/senior standing. Formerly HUMN 3043.

**HUMN 3250-3. Dramatic Arts.** Interdisciplinary course that examines and compares various forms of the dramatization of narrative: written texts, audiotapes, videotapes, film, and live performance. Compares different versions of the same narrative or theme, especially if different media are used and different time periods are involved. Prereq., HUMN 2000 or junior/senior standing. Formerly HUMN 4133.

**HUMN 3321-3. Culture and Literature of Ancient China.** Focuses on the religious, cultural, philosophical, and literary aspects of ancient Chinese civilization (1500 B.C.–A.D. 200). Special attention is paid to foundational works that influenced later developments in Chinese culture. All readings are in English. Recommended prereq., EALC 1011 or CHIN 1051. Same as CHIN 3321.

**HUMN 3341-3. Literature and Popular Culture in Modern China.** Surveys 20th century Chinese (including Taiwanese) literature and popular culture against the historical background of rebellion, revolution, and reform. Emphasizes close and critical reading skills and an understanding of how aesthetic texts reflect and critically engage with historical and cultural experiences. Assignments include novels, essays, short stories, poems, plays, songs, films, and scholarly articles. Approved for arts and sciences core curriculum: literature and the arts. Recommended prereq., EALC 1011 or CHIN 1051. Same as CHIN 3341.

**HUMN 3505-3. The Enlightenment: Tolerance and Emancipation.** Examines the Enlightenment belief in reason and the common humanity of all individuals and cultures. Emphasizes arguments for and against freedom of religion, abolition of slavery, and emancipation of women in 18th-century European and American literature and thought. Same as GRMN 3505. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 3550-3. Imag(in)ing Meaning.** Explores the role of imagination in constructing narratives of meaning through close readings of various genres (fiction, poetry, manifesto, essay) various modes of artistic expression (art, film, photography, documentary), and essays of critical theory. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 3590-3. Modern Literature and the Bible: A Case Study in Intertextuality.** Alternating between close readings of biblical texts and works by such authors as Beckett, O'Connor, Dostoevsky, Garcia Marquez, and works as film, this class explores the complex interaction between modern literature and the Bible in respect to ideals, ideas, symbols. Prereq., HUMN 2000 or junior/senior standing. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 3660-3. The Postmodern.** Analyzes the cultural and critical practices as well as the thought that defines the postmodern period at the end of twentieth century. Prereq., HUMN 2000 or junior/senior standing. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 3702-3. Dada and Surrealist Literature.** Surveys the major theoretical concepts and literary genres of the Dada and Surrealist movements. Topics include Dada performance and cabaret, the manifesto, montage, the ready-made, the Surrealist novel, colonialism and the avant-garde, and literary and philosophical precursors to the avant-garde. Taught in English. Same as GRMN 3702. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 3811-3. Classical Japanese Literature in Translation.** Surveys the major works and authors of classical Japanese literature, both poetry and prose, from the earliest historical records and literary anthologies through the Heian period (784–1185). Taught in English. Recommended prereq., JPNS 1051. Same as JPNS 3811.

**HUMN 3820-3. Greek and Roman Antiquity in Music, 1600 to Present.** Explores the influence of Greek and Roman mythology and history on various genres of music since 1600. Explains the context and meaning of ancient themes and their use by composers from the Renaissance to the present. Recommended prereq., CLAS 1100. Same as CLAS 3820.

**HUMN 3841-3. Modern Japanese Literature in Translation.** Surveys the major works, authors, and genres of literature from the late Meiji period and 20th century in their historical and cultural contexts. Attention is given to various approaches of literary analysis and interpretation. Taught in English. Recommended prereq., JPNS 1051. Same as JPNS 3841.

**HUMN 3930 (1-6). Humanities Internship.** Students gain academic credit and professional experience working in museums, galleries, arts administration, and publishing. They work 3–18 hours per week with their professional supervisor and meet regularly with a faculty advisor who determines the reading and writing requirements. Prereqs., junior standing and interview with faculty advisor.

**HUMN 3935 (1-3). Humanities Internship: Literature and Social Violence.** See HUMN 4835. Credit not granted for this course and HUMN 2935. Coreq., HUMN 4835.

**HUMN 4000-3. The Question of Romanticism.** Interdisciplinary study of literature, art, and music from 1780 to 1830 in France, England, and Germany. Prereq., HUMN 2000 or restricted to juniors/seniors. Credit not granted for this course and HUMN 4102.

**HUMN 4004-3. Topics in Film Theory.** Provides topic-centered analyses of controversial areas in film theory. Students read extensive materials in the topic area, analyze and summarize arguments as presented in the literature, write "position" papers, and make oral presentations in which they elaborate their own arguments about specific assigned topic, establishing critical dialogue with the primary materials. May be repeated up to 6 total credit hours. Prereq., FILM 3051 or instructor consent. Restricted to senior FILM, FMST, or HUMN majors. Approved for arts and sciences core curriculum: critical thinking. Same as FILM 4004 and ARTF 5004.

**HUMN 4010-3. Hitchcock and Freud.** Applies Freudian psychoanalysis to the films of Alfred Hitchcock. Students will familiarize themselves with the Freudian methodology by reading a number of books and essays and then apply both Freud's general ideas as well as specific texts to particular aspects, both formal and contentual, of his films. Particular attention will be given to the important field of "feminism and psychoanalysis" as it relates to the study of the role of women in Hitchcock's films. Prereq., HUMN 2000 or restricted to juniors and seniors.

**HUMN 4020-3. Reading, Chance, and Guessing.** Considers the method of the humanities relationship to those of the natural and social sciences, especially in view of their respective ability or claim to predict the future and to master chance. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4030-3: The Art of Travel.** Examines the art of travel: not where to go and what to do, but rather the philosophical concepts about why people travel. Areas of discussion will include Exploration, Discovery, Escape, Pilgrimage, the Grand Tour, Expatriotism, Exile, Nomadism, Armchair Travel, and the Sense of Home. Materials will include books by travel writers, novels, films, essays, short stories, art, music, and historical documents.

**HUMN 4060-3. Reading Theory.** Explores, through guided discussions, the concept of theory itself and how a theory is constructed. Emphasizes the close reading of theory in order to learn to analyze critically, considering

theory as something to be thought about rather than simply applied. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4082-3. 19th Century Art and Literature.** Interdisciplinary study of English fiction and poetry together with related movements in visual arts. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4092-3. Advanced Studies in the Humanities.** Students should check with the department for specific semester topics. May be repeated up to 9 total credit hours. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4093-3. Advanced Topics in the Humanities.** Students should check with the department for specific semester offerings. May be repeated up to 9 total credit hours. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4110-3. Greek and Roman Epic.** Students read in English translation the major epics of Greco-Roman antiquity such as the *Iliad*, *Odyssey*, *Argonautica*, *Aeneid*, and *Metamorphoses*. Topics discussed may include the nature of classical epic, its relation to the novel, and its legacy. No Greek or Latin required. Same as CLAS 4110. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4120-3. Greek and Roman Tragedy.** Intensive study of selected tragedies of Aeschylus, Sophocles, Euripides, and Seneca in English translation. No Greek or Latin required. Same as CLAS 4120. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4130-3. Greek and Roman Comedy.** Studies Aristophanes, Plautus, and Terence in English translation. No Greek or Latin required. Same as CLAS 4130. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4131-3. The Greek and Roman Novel.** Studies five surviving complete Greek novels from classical antiquity, three Latin novels, and their predecessors and contemporary neighbors in the genres of Greek prose fiction. Readings in English translation. No required prerequisite, but a previous course in classical literature or myth is recommended. Same as CLAS 4140/5140.

**HUMN 4135-3. Art and Psychoanalysis.** Explores psychoanalytic theory as it relates to our understanding of literature, film, and other arts. After becoming familiar with some essential Freudian notions (repression, narcissism, ego/libido, dream work, etc.), students apply these ideas to works by several artists (e.g., Flaubert, James, Kafka, Hoffmann, and Hitchcock). Prereq., HUMN 2000 or junior/senior standing. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4140-3. The Age of Dante: Readings from *The Divine Comedy*.** Focuses on close reading of Dante's poetry with emphasis on the intellectual, religious, political, and scientific background of the medieval world. Taught in English. Prereq., junior standing or instructor consent. Same as ITAL 4140. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4150-3. *The Decameron* and the Age of Realism.** Analyzes the rise of realism in 13th and 14th century Italian literature and parallel manifestations in the visual arts. Focuses on Boccaccio's *Decameron* and contemporary realistic prose and poetry with emphasis on gender issues and medieval cultural diversity. Taught in English. Prereq., junior standing or instructor consent. Same as ITAL 4150. Approved for arts and science core curriculum: human diversity or literature and the arts.

**HUMN 4155-3. Philosophy, Art, and the Sublime.** Explores philosophies of art, theories of the sublime, and the relation between art and morality through philosophy, literature, and the visual arts. Includes works by Plato, Longinus, Burke, Rousseau, Kant, Mary Shelley, Melville, Friedrich, Turner, and Pollock. Prereq., HUMN 2000 or junior/senior standing. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 4502-3. Nietzsche: Literature and Values.** Emphasis is placed on Nietzsche's major writings spanning the years 1872-1888, with particular attention to the critique of Western values. A systematic exploration of doctrines, concepts, and ideas leading to the values of creativity. Restricted to sophomores/juniors/seniors. Same as GRMN 4502. Approved for arts and sciences core curriculum: ideals and values.

**HUMN 4504-3. Goethe's *Faust*.** Systematic study of the Faust motif in Western literature, with major emphasis on *Faust I* and *II* by Goethe and Thomas Mann's *Doctor Faustus*. Same as GRMN 4504/5504 and COML 5504. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4555-3. The Arts of Interpretation.** Introduces various hermeneutical methodologies (literary/philosophical criticism, biblical exegesis, art history, etc.) with which to examine the question of interpretation. Methodologies are studied in close conjunction with particular works of art. Prereq., HUMN 2000 or junior/senior standing.

**HUMN 4730-3. Italian Feminisms: Culture, Theory, and Narratives of Difference.** Studies Italian women writers, artists, and film makers of this century. Literary and visual texts are analyzed in dialogue with readings of leading Italian gender theorists. Italian history and culture is reread by following the development of a discourse about women. Taught in English; readings in Italian for Italian majors. Same as ITAL 4730. Approved for arts and sciences core curriculum: human diversity.

**HUMN 4811-3. 19th Century Russian Literature.** Surveys background of Russian literature from 1800 to 1900. Russian writers and literary problems in the 19th century emphasizing major authors: Pushkin, Lermontov, Gogol, Dostoevsky, Turgenev, Tolstoy, and Chekhov. Same as RUSS 4811. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4821-3. 20th Century Russian Literature and Art.** Interdisciplinary course emphasizing the influence of art in 20th century Russian literature. Follows the changing cultural landscape from the time when Russia was in the vanguard of modern European literature to the gradual cultural relaxation that culminated in perestroika and glasnost. Same as RUSS 4821. Approved for arts and sciences core curriculum: literature and the arts.

**HUMN 4835-3. Literature and Social Violence.** Provides a theoretical understanding of heightened awareness arising from literary and sociological investigations of contemporary sources of social violence (gang culture, racism, domestic violence), combined with the concrete knowledge offered by an internship in a social service agency. Optional internship credit is available. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: contemporary societies.

**HUMN 4840 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**HUMN 4990-3. Senior Humanities Seminar.** In-depth interdisciplinary study of a selected topic in humanities. Prereqs., 6 hours of upper-division humanities, senior standing, and 3.00 GPA in humanities.

## Integrative Physiology

**IPHY 1950-3. Introduction to Scientific Writing in Integrative Physiology.** Provides an overview of writing skills and strategies, emphasizing those most important to the sciences, especially kinesiology and physiology. Focuses on fundamental skills, objective analysis, and scientific persuasion, with attention to clear organization and style, academic and scientific mechanics, and distinctions between audiences. Restricted to freshmen/sophomore/junior KINE/IPHY majors. Meet MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**IPHY 2010 (1-3). Seminar in Integrative Physiology.** Introduces a small group of lower-division students to current research topics in integrative physiology. Emphasizes relevant applications to real-world situations. May be repeated up to 6 total credit hours when topics vary.

**IPHY 2800-4. Introduction to Statistics.** Examines the application of statistics to research relevant to integrative physiology. Includes instruction and hands-on experience with related computer programs and interpretation of the results of their use. Restricted to IPHY majors.

**IPHY 2910 (1-3). Practicum in Integrative Physiology.** Offers practical experience in organized situations with direct supervision. Restricted to IPHY majors. May be repeated up to 3 total credit hours. Prereq., instructor consent.

**IPHY 3010 (1-2). Teaching in Integrative Physiology.** Provides an opportunity to assist in teaching specific laboratory sections in IPHY under direct faculty supervision. Students must make arrangements with the faculty member responsible for the course in which they plan to assist. May be repeated up to 6 total credit hours. Prereq., junior standing and instructor consent.

**IPHY 3060-4. Cell Physiology.** Lect. and lab. Introduces the biology of eukaryotic systems at molecular, cellular, and systems levels of integration, emphasizing the complementarities of structure and function and physiological

mechanisms of regulation at the cellular and molecular level. Prereqs., EBIO 1210, 1220, 1230 and 1240 or MCDB 1150, 1151, 2150 and 2151, and IPHY 3430 or 3470. Restricted to sophomores/juniors/seniors.

**IPHY 3130-3. Environmental Animal Physiology.** Broad consideration of biochemical, physiological, and behavioral adaptations of vertebrate animals to various environments and strategies for allocation of energetic expenditures in relation to environmental demands. Prereq., one year general biology.

**IPHY 3410-3. Introduction to Human Anatomy.** Introduces the basic of human anatomy. Prereq., EBIO 1210, 1220, 1230, 1240.

**IPHY 3415-2. Human Anatomy Laboratory.** Introduces structures of the human anatomical systems using human cadavers and animal tissue. This laboratory is meant to complement IPHY 3410, Introduction to Human Anatomy lecture. Prereq., EBIO 1210, 1220, 1230, 1240; IPHY 3410 (or as coreq.)

**IPHY 3420-3. Nutrition, Health, and Performance.** Highlights basic principles of nutrition and their relation to health. Approved for arts and sciences core curriculum: natural science.

**IPHY 3430-3. Introduction to Human Physiology.** Introduces the physiology of the nervous, muscular, cardiovascular, respiratory, urinary, immune, endocrine, and reproductive systems. Intended for non-majors. Prereqs., EBIO 1210 and 1220; CHEM 1071, 1133 and 1134 or 1171. Recommended prereqs., IPHY 3410 and 3415.

**IPHY 3435-2. Human Physiology Laboratory.** Introduces laboratory experience in selected aspects of human physiology for students in pharmacy and allied health programs. Uses animals and animal tissues. Prereq., EBIO 1210, 1220, 1230, 1240; CHEM 1071 or 1133 and 1134 or 1171. Prereq. or Coreq. IPHY 3430 or 3480.

**IPHY 3450-3. Comparative Animal Physiology.** Lect., lab, and rec. Introduces principles of animal physiology and responses to environmental change. Uses animals and/or animal tissues. Prereqs., EBIO 1210, 1220, 1230, 1240, or equivalent.

**IPHY 3470-3. Human Physiology 1.** Focuses on scientific thinking, cell physiology, neurophysiology, endocrinology, immunology, and musculoskeletal physiology. The first semester of a two-semester sequence for IPHY majors. Prereqs., EBIO 1210 and 1220 or MCDB 1150 and 2150; CHEM 1071, 1133 and 1134, or 1171, and IPHY 3410 and 3415.

**IPHY 3480-3. Human Physiology 2.** Focuses on the physiology of the respiratory, cardiovascular, urinary, digestive, and reproductive systems. The second semester of a two-semester sequence for IPHY majors. Prereqs., EBIO 1210 and 1220 or MCDB 1150 and 2150; CHEM 1071, 1133 and 1134, or 1171, IPHY 3470, 3410, and 3415. Coreq., IPHY 3435.

**IPHY 3500-2. Applied Clinical Research.** Introduces fundamental concepts of clinical research to those interested in pursuing a career in medicine or medical research. In addition to lectures introducing students to research design, errors in research, and basic biostatistics, there will be significant emphasis on participation in on-going medical research at Denver Health Medical Center and The Children's Hospital. This unique experience will provide students with first-hand exposure to all aspects of clinical research. Prereqs., MCDB 1150 and 2150, or EBIO 1210 and 1220, and CHEM 3311. Recommended prereq., premedical focus and/or previous research experience.

**IPHY 3660-3. Dynamics of Motor Learning.** Focuses on information processing approaches and dynamical systems theory as explanations for human motor learning and the coordination of movement. Various topics are discussed from both perspectives including practice organization, attainment of elite performance, and the production of novel movements. Approved for arts and sciences core curriculum: natural sciences.

**IPHY 3700-3. Scientific Writing in Integrative Physiology.** Takes a process-based approach to writing. Assignments and classroom experiences emphasize critical thinking, using scientific evidence and reasoning to construct original arguments, and applying conventions and problem-solving skills to craft successful documents. Prereq., IPHY 2800. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: written communication.

**IPHY 3730-3. Brain and Behavior.** Emphasizes how the brain controls animal behavior. Covers fundamental concepts of molecular, cellular, and systems physiology to understand 1) how individual nerves work and communicate,

2) how the nervous system controls various aspects of behavior, and 3) how experimental approaches are used to unravel the neurobiological basis of animal behavior. Prereq., C- or better in EBIO 1210 or PSYC 2012 or MCDB 1150. Approved for arts and sciences core curriculum: natural sciences.

**IPHY 3800-3. Forensic Biology.** Introduces basic concepts of modern forensic science with emphasis on biological aspects such as forensic entomology, forensic botany, hair analysis, forensic anthropology, and forensic DNA analysis. Prereq., MCDB 1150, 1151, 2150, 2151 or EBIO 1210, 1220, 1230, 1240, and one-year chemistry with lab.

**IPHY 3810-1. Forensic Biology Laboratory.** Introduces basic laboratory techniques and procedures of modern forensic science with emphasis on biological aspects such as forensic entomology, forensic botany, hair analysis, forensic anthropology, and forensic DNA analysis. Prereq., MCDB 1150, 1151, 2150, 2151 or EBIO 1210, 1220, 1230, 1240, and one-year chemistry with lab. Coreq., IPHY 3800.

**IPHY 4010 (1-3). Seminar in Integrative Physiology.** Introduces a small group of students to current research topics in integrative physiology, evaluation of current research, and discussion of critical issues. May be repeated up to 6 total credit hours when topics vary. Prereq., IPHY 2800.

**IPHY 4200-3. Physiological Genetics and Genomics.** Introduces genetic and genomic concepts as they apply to mammalian physiology. The course covers fundamental concepts and methods in molecular genetics and genomics and their applications towards understanding the role of genetics in the normal and pathological function of physiological systems. Same as IPHY 5200.

**IPHY 4440-4. Endocrinology.** Introduces mammalian endocrine system. Course provides a thorough analysis and integration of chemical communication by hormones, paracrines, and semiochemicals. Prereq., IPHY 3430, 3450 or 3470. Same as IPHY 5440.

**IPHY 4470-3. Biology of Human Reproduction.** Lect. Anatomy and physiology of human reproduction, including gender determination, embryology, puberty, menstrual cycle, pregnancy, lactation, menopause, sexual behavior, sexual abnormalities and contraception. Open to nonmajors. Prereqs., EBIO 1210, 1220, 1230, 1240.

**IPHY 4480-3. Comparative Reproduction** Lect. Focuses on comparative anatomy and physiology of reproductive system and the evolution of reproductive behavior in vertebrates and invertebrates. Topics include courtship, mating, fertilization, estrous and menstrual cycles, and environmental control of seasonal reproduction. Prereq., EBIO 1210, 1220, 1230, 1240. Recommended prereq., IPHY 3430.

**IPHY 4500-4. Histology: Cells and Tissues.** Lect. and lab. Analysis of vertebrate histology and preparation of vertebrate tissues for light microscopic examination. Especially useful to students of vertebrate anatomy, development, and physiology. Uses animals and/or animal tissue. Prereq., EBIO 3700, or IPHY 3430, or IPHY 3450, or IPHY 3470. Same as IPHY 5500.

**IPHY 4540-5. Biomechanics.** Applies the principles of physics and physiology to the analysis of human movement. Quantitative analysis of the forces, torques, mechanical energy, power impulses and momentum associated with human movement. Mechanical properties of muscles, tendons, ligaments, and bones. Prereqs., IPHY 2800, 3410, 3430 or 3470, PHYS 2010, MATH 1300 OR 1310 or APPM 1350. Restricted to IPHY majors.

**IPHY 4580-3. Sleep Physiology.** Describes the physiology and neurobiology of sleep and impact of sleep, sleep deprivation, and sleep disorders on immune, endocrine, cardiovascular, respiratory, and neural systems, as well as examines changes in sleep across the life span. The integrative nature of sleep and circadian rhythms in normal physiological and cognitive function and their importance in health and disease processes will be emphasized. Prereqs., IPHY 2800 and 3470, and either MCDB 1150, 1151, 2150 and 2151, or EBIO 1210, 1220, 1230 and 1240. Same as IPHY 5580.

**IPHY 4600-4. Immunology.** Studies the immune system, a multi-cellular system that functions to protect us from disease. Introduces concepts associated with the development and function of individual cells of the immune system (T-cells, B-cells, neutrophils, dendritic cells, macrophages), as well as their integrative roles in physiology and host defense. Evening exams required. Prereq., IPHY 3430 or 3470. Restricted to majors. Same as IPHY 5600.

**IPHY 4650-5. Exercise Physiology.** Examines physiological adjustments that occur in selected organ systems with acute and chronic exercise. Topics center on the physiological mechanisms pertaining to metabolic, cardiovascular, and hormonal alterations. Prereqs., IPHY 2800 and 3430 or IPHY 3470 and 3480. Prereq. or coreq., IPHY 3410. Restricted to junior/senior IPHY majors.

**IPHY 4660-3. Critical Thinking in Integrative Physiology.** Covers specific integrative physiology topics in areas such as animal physiology, endothelial function, neurobiology, exercise immunology, and exercise physiology. May be repeated up to 6 total credit hours. Restricted to junior/senior IPHY and EBIO majors. Prereq., 13-hours of IPHY course work.

**IPHY 4680-3. Critical Thinking in Exercise Physiology.** Covers specific exercise physiology topics such as cellular cause of fatigue and muscle soreness, heart disease, regulation of blood flow, diabetes, aging, training adaptations, exercise at high altitude, ergogenic aids, and excitation-contraction of muscle. Prereq., IPHY 4650. Restricted to juniors/seniors.

**IPHY 4720-4. Neurophysiology.** Describes how the nervous system controls the activity of muscles and how the sensory effects of muscle activity influence the function of the nervous system. Prereqs., IPHY 2800 and IPHY 3430 or 3470. Prereq. or coreq., IPHY 3410. Restricted to junior/senior IPHY majors.

**IPHY 4730-3. Motor Control.** Examines the central and peripheral neural structures responsible for the control and coordination of human movement. Theories of motor control are also investigated from a behavioral and biomechanical view. Concepts in reflexive and voluntary movement control are emphasized. Prereq., junior standing. Same as IPHY 5730.

**IPHY 4740-3. Theory of Motor Skill Learning.** Offers a critical analysis of motor learning theories, including Adam's closed loop theory, Schmidt's schema theory, and the influence of contextual interference on learning and performance. Also covers feedback and practice organization. Projects and presentations required. Prereq., junior standing. Same as IPHY 5740.

**IPHY 4860(1-6). Independent Study: Undergraduate.** Students may register for more than one section per term. May be repeated up to 8 total credit hours.

**IPHY 4870(1-3). Honors Thesis.** Prereq., IPHY 2800 and 3700.

**IPHY 4930(1-6). Internship.** Provides an opportunity for field/laboratory work in a variety of different settings. Prereq., junior or senior status and completion of at least two of the major core classes. Consult with faculty for approval. May be repeated up to 6 total credit hours.

**IPHY 5100-2. Colloquium in Integrative Physiology.** May be repeated up to 6 total credit hours.

**IPHY 5102-2. Molecular Genetic Analysis of Physiology and Behavior.** Utilizes molecular, classical, and quantitative genetics as a method for understanding the molecular basis of human and animal physiology and behavior. Required of first year students in Behavioral Genetics certificate program. Prereqs., EBIO 2070 or 2670, or MCDB 2150.

**IPHY 5200-3. Physiological Genetics and Genomics.** Same as IPHY 4200 and PSYC 5200.

**IPHY 5232-3. Molecular Genetics and Behavior.** Covers fundamental mechanisms of gene action, including DNA structure and regulation of gene expression. Discusses molecular techniques used to examine human genetic diseases. Emphasizes genetic diseases with behavioral and neurological abnormalities. Prereq., PSYC 5102 or instructor consent. Same as PSYC 5232.

**IPHY 5262-3. Applications of Bioinformatics and Genomics.** Introduces graduate students to public online resources to be used for genetics research including: NCBI resources, human genome resources, gene expression tools, and proteomics applications.

**IPHY 5300-3. Statistical Genetics for Complex Traits.** Focuses on the methods of mapping complex disease genes in both population and family-based samples. Topics include both linkage and association analyses of qualitative and quantitative phenotypes.

**IPHY 5440-4. Endocrinology.** Same as IPHY 4440.

**IPHY 5500-4. Histology: Cells and Tissues.** Same as IPHY 4500.

**IPHY 5550-3. Exercise Biochemistry.** Examines the underlying biochemical mechanisms that are responsible for the physiological adaptations to short- and long-term dynamic exercise including carbohydrate, fat, and protein

metabolism. The interaction of key biochemical alterations as it relates to disease (diabetes, obesity, and aging) and exercise will be addressed. Prereq., one year of chemistry. Prereq. or coreq., IPHY 4650 or instructor consent.

**IPHY 5580-3. Sleep Physiology.** Same as IPHY 4580.

**IPHY 5600-4. Immunology.** Restricted to graduate students. Same as IPHY 4600.

**IPHY 5640-3. Clinical and Exercise Electrocardiography.** Lectures and laboratory practice in recognition and evaluation of normal and pathological electrical activity of the heart as demonstrated by the electrocardiogram. For graduate students who monitor laboratory physiological testing and/or prescriptive exercise programs in laboratory settings. Prereqs., IPHY 3430 and 4650.

**IPHY 5730-3. Motor Control.** Same as IPHY 4730.

**IPHY 5740-3. Theory of Motor Skill Learning.** Same as IPHY 4740.

**IPHY 5800-5. Advanced Statistics and Research Methods in Integrative Physiology.** Focuses on how descriptive, correlational, and inferential statistics apply to physiological data. Provides instruction and experience in using related computer programs and examines the many considerations involved in physiological research methods. Prereq., IPHY 2800. Restricted to IPHY graduate students.

**IPHY 5830-3. Writing for the Research Scientist.** Promotes understanding of the rhetorical goals, structure, design, and language for effective scientific texts, emphasizing research reports and grant proposals. Supports students in executing advanced cognitive processes in planning, drafting, and revising. Involves instructor-guided procedural facilitation and peer-review workshops based on students' current writing projects in courses and laboratory research. Prereq., basic proficiency in English. Restricted to graduate students.

**IPHY 5840(1-6). Graduate Independent Study.** Restricted to IPHY graduate students. May be repeated up to 7 total credit hours.

**IPHY 6010(1-3). Seminar.** Presents special topics in integrative physiology. May be repeated up to 6 total credit hours.

**IPHY 6020(1-3). Seminar.** Presents special topics in integrative physiology. May be repeated up to 6 total credit hours.

**IPHY 6100(1-3). Independent Study—Doctoral.** Mentor-supervised academic experience designed to develop and enhance the professional/research skills of the doctoral candidates from the department.

**IPHY 6610-3. Controversies in Exercise Physiology.** Discusses controversial topics in exercise physiology and biochemistry. Critically analyzes the physiological mechanisms, significance, and responses of each topic. Students participate in scientific debates and article critiques. Prereq., IPHY 4650.

**IPHY 6620-3. Current Topics in Exercise Physiology.** Presents and evaluates relevant issues in the field of exercise physiology; conducted in a seminar format. May be repeated up to 9 total credit hours. Prereq., IPHY 4650.

**IPHY 6640-3. Systemic Cardiovascular Regulations.** Focusing on systemic control of the cardiovascular system at rest and in response to acute and chronic physiological states such as exercise. Primary emphasis is on the human cardiovascular system in health, chronic disease, and normal aging. Restricted to IPHY graduate students. Prereqs., IPHY 3410, 3430, and 4650.

**IPHY 6650-3. Cellular Cardiovascular Physiology.** Focuses on the cellular control of cardiac and smooth muscle contraction, at rest and in response to acute and chronic exercise. Addresses certain pathophysiological and physiological adaptive mechanisms. Prereq., IPHY 4650.

**IPHY 6660-3. Locomotion Energetics and Biomechanics.** Critiques and discusses both classic and cutting edge scientific research in the area of terrestrial locomotion. Recommended prereqs., IPHY 4540, 4650, and graduate standing in IPHY or EBIO.

**IPHY 6670-2. Hypothesis Testing in Locomotion Biomechanics.** Focuses on the scientific process including formulating and testing hypotheses in studies of locomotion. Students analyze primary articles to determine whether the studies tested hypotheses and to generate new hypotheses that logically follow from previous studies.



**IPHY 6680-3. Matlab for Physiological and Biomechanical Research.** This introduction to Matlab programming will teach the skills needed to write and modify programs for data acquisition and analysis, statistics, plotting, and simulation.

**IPHY 6830-3. Professional Skills for the Research Scientist.** Focuses on delineation of research problems, types of research, design of experiments, specific research procedures and tools, and instruction in preparation of proposals, research papers, and theses.

**IPHY 6840 (1-3). Research Project.** Involves a scholarly investigation of a selected topic using literature and/or experimental techniques. Advisor required. May be repeated up to 7 total credit hours.

**IPHY 6940-3. Master's Degree Candidate**

**IPHY 6950 (1-6). Master's Thesis.** Restricted to IPHY graduate students.

**IPHY 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Restricted to IPHY graduate students.

## International Affairs

**IAFS 1000-4. Global Issues and International Affairs.** Introduces the student to the international affairs program. The course examines political and economic development in several countries in many different world regions. Examines historical trends and development as well as current political and economic issues. Approved for arts and sciences core curriculum: contemporary societies.

**IAFS 3000-3. Special Topics in International Affairs.** Junior or senior level umbrella seminar spanning a variety of topics relevant to the study of international affairs. Subjects addressed under this heading vary according to student interest and faculty availability. May be repeated up to 9 total credit hours. Restricted to junior and senior IAFS and PSCI majors.

**IAFS 3300-3. Economy, Politics and Society in the Middle East.** Presents social, political, and economic aspects of the Middle East through a faculty-led study abroad in Kuwait, featuring interactions with officials, bankers, university faculty and local students. Offers a unique opportunity to discuss issues with Kuwaitis at Diwanyas, as well as to participate in seminars and workshops with local faculty and representatives of Kuwaiti businesses and government agencies. Prereq., ECON 1000 or 2020.

**IAFS 4500-3. The Post-Cold War World.** Capstone course for international affairs majors. Examines the ways in which the end of the Cold War, the collapse of failed states, and the rise of global terrorism changed the world. Studies how peoples, governments and nongovernmental organizations faced new social, political, economic and security challenges in an era of globalization. Includes discussion, oral reports, critical book reviews, and research papers. Restricted to junior/senior IAFS majors.

**IAFS 4800-3. Honors Seminar in International Affairs.** Directed research course tailored to the particular research interests of the students enrolled. Devoted to research methodology and the development of students' research. Prereq., 3.30 GPA and 3.40 IAFS GPA.

**IAFS 4810-3. Honors in International Affairs.** Continuation of IAFS 4800. Students complete original research begun in the fall and write and defend their honors thesis. They meet regularly with the instructor. Prereq., IAFS 4800.

**IAFS 4900 (1-6). Independent Study in International Affairs.** Provides an opportunity to earn academic credit for learning outside the formal class structure. Students interested in doing in-depth research propose a research project to a faculty sponsor and then work closely with that person to produce a piece of original research. Prereq., upper-division standing, GPA of 3.00 or better, grade of C or better in all lower-division courses, and at least 6 upper-division courses.

**IAFS 4930 (3-6). Internship in International Affairs.** Working individually under the guidance of a public or private organization, students are assigned to projects selected for their academic suitability. Written assignments occur throughout the semester. May be repeated up to 6 total credit hours. Prereq., departmental approval.

## INVST Community Studies

**INVS 1000-4. Responding to Social and Environmental Problems through Service Learning.** By integrating theory with required community service, students explore how problems are shaped by cultural values and how alternative value paradigms affect the definition of problems in areas such as education and the environment. Students examine different approaches to solving problems and begin to envision new possibilities. Approved for arts and sciences core curriculum: ideals and values.

**INVS 1513-3. Civic Engagement: Using the Electoral Process as a Tool for Social Change.** Designed to educate and inspire civic engagement primarily in the area of electoral politics. Examines various explanations of why people participate in the electoral process and whom they choose to support. Develops the practical skills necessary to participate successfully in the electoral arena. Through a service component, the course provides experience working on a campaign and mobilizing others to participate in the electoral process.

**INVS 1523-3. Civic Engagement: Democracy as a Tool for Social Change.** Educates and inspires students for civic engagement by exploring democratic values and the rights and responsibilities of citizenship. Develops theoretical knowledge and practical skills for participating in a diverse democratic society, especially at the state level, through analyzing legislative issues, making policy recommendations, and advocating for change. Approved for arts and sciences core curriculum: United States context.

**INVS 2919-3. Renewing Democracy in Communities and Schools.** Examines concepts of activism, citizenship, democracy, power, and diversity through classroom discussions and participation in a local high school's Public Achievement project. Through community-based partnerships, students will develop leadership skills; dialogue with diverse groups of people; identify multiple perspectives around controversial issues; and learn to use research and writing to articulate public problems and advocate for their solutions. May be repeated up to 6 total credit hours.

**INVS 3000 (3-4). Innovative Approaches to Contemporary Issues through Service Learning.** Explores creative approaches for solving complex social and environmental issues, with a focus on peace and population. Students analyze the root causes of issues in theoretical and historical contexts, and develop their understanding of effective and innovative approaches to change. This course has a requirement of community service. Recommended prereq., upper-division status. Approved for arts and sciences core curriculum: contemporary societies.

**INVS 3041-3. Self and Consciousness.** Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation. Prereqs., SOCY 1001, and SOCY 3001 or 3011, or instructor consent. Same as SOCY 3041.

**INVS 3100 (3-4). Multicultural Leadership: Theories, Principles and Practices.** Focuses on leadership theories and skills necessary for effectiveness in multicultural settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change through comparative analyses of western and non-western theories and practices. Community service required. Same as ETHN 3201 and LDSP 3100. Approved for arts and sciences core curriculum: human diversity.

**INVS 3302-3. Facilitating Peaceful Community Change.** Students gain knowledge and skills that enable them to become effective facilitators of community goals. Focuses on understanding the processes of community building with a multicultural emphasis. Students are encouraged to apply concepts of life experiences and to examine themselves as potential change agents. Theory and summer experience are integrated. Prereq., admission to INVST. Coreq., INVS 3912. Same as WMST 3302.

**INVS 3304-3. Human Rights: Promotion and Protection, an NGO Perspective.** Explores the world of international human rights with a focus on the role of non-governmental organizations (NGOs) in the evolution of human rights ideologies, social structures, technologies and strategies. Students examine the inter-relatedness and inter-dependence of human rights, and the work of non-governmental organizations as related to other institutions of civil soci-

ety, national governments, and international bodies. Recommended prereq., INVS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**INVS 3402-3. Implementing Social and Environmental Change.** Examines grassroots democracy as a means for creating comprehensive, solution-based strategies to address social and environmental problems. Students develop an understanding of the use of democracy for positive social change, identify how changes are initiated within movements, and learn the theory and practice of effective and responsible change efforts.

**INVS 3931 (1-3). The Community Leadership Internship, Part 1.** Develops students' competencies as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community supervisor, students learn organizational leadership skills by serving as volunteer staff members at community-based organizations. Prereq., admission into INVST CLP. May be repeated up to 6 total credit hours.

**INVS 3932 (1-6). The Community Leadership Internship, Part 2.** Develops students' competencies as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community supervisor, students learn organizational leadership skills by serving as volunteer staff members at community-based organizations. May be repeated up to 6 total credit hours.

**INVS 4302-3. Critical Thinking in Development.** Exposes students to current issues in the political economy of development. Subjects range from globalization, democratization, and economic development. Specifically, the course explores the international and domestic determinants of economic development with special reference to currency markets, foreign direct investment, trade, and democratization. Prereqs., PSCI 2012 or IAFS 1000, ECON 2010 and 2020, and one upper-division PSCI course. Same as PSCI 4732. Approved for arts and sciences core curriculum: contemporary societies.

**INVS 4402-3. Nonviolent Social Movements.** Explores theories of democracy and development in relation to movements for nonviolent social change. Focuses on means and ends, spirituality, leadership, decision-making, civil society, cooperative economics, ecology and decentralized powers. Restricted to senior SOCY/PSCI majors. Same as SOCY 4111.

**INVS 4931 (1-3). Community Leadership in Action, Part 1.** Develops students' expertise as community leaders. Under the supervision of an instructor and a community advisor, students design a community-based project. Prereqs., admission to INVST CLP, INVS 3931 and 3932. May be repeated up to 6 total credit hours.

**INVS 4932 (1-6). Community Leadership in Action, Part 2.** Develops students' expertise as community leaders working for a just and sustainable world. Under the supervision of an instructor and a community advisor, students learn organizational and leadership skills by designing, implementing and evaluating a community-based project. First-hand experience provides students with a deepened understanding of the complex issues facing humanity, and competence with solution-based strategies. May be repeated up to 6 total credit hours.

**INVS 4999 (1-6). Teaching Social Justice.** INVS students participate in a service-learning practicum under the supervision of an INVS instructor. They explore teaching strategies for implementing concrete educational goals. Focusing on the issues of social justice and social change, they learn how to encourage higher levels of creativity and analysis among students. May be repeated up to 6 total credit hours. Prereqs., INVS 3302, 3912, 4033, 4034, 4732, 4914, 4915, and 4734. Must have completed 16 hours required INVS course work (min. grade B-).

## Jewish Studies

**JWST 1030-3. Biblical Hebrew.** This course is designed to enable students to read the Hebrew Bible in the original language. The focus will be the ability to read the various genres of the text, utilizing both the tools of modern language acquisition and the study of classical grammar methods. Same as HEBR 1030.

**JWST 1040-3. Biblical Hebrew 2.** Building on HEBR/JWST 1030, this course continues to build expertise in reading the Hebrew Bible. Modern language acquisition and classical grammar study methods equip students with the

tools to translate and read the various genres of the Biblical material. Prereq., HEBR/JWST 1030 or instructor consent. Same as HEBR 1040.

**JWST 1108-3. Introduction to Jewish History.** Surveys Jewish history from the earliest times to the present. Includes biblical history; Judaism in late antiquity, medieval, and early modern times; and special emphasis on the 19th century to the present, including American Judaism, the Holocaust, anti-Semitism, Zionism, and Israel. Same as HIST 1108 and GSLL 1108. Approved for arts and sciences core curriculum: historical context.

**JWST 2350-3. Introduction to Jewish Culture.** Explores the development and expressions of Jewish culture as it moves across the chronological and geographical map of the historic Jewish people, with an emphasis on the variety of Jewish ethnicities and their cultural productions, cultural syncretism, and changes. Sets the discussion in a historical context, and looks at cultural representations that include literary, religious, and visual texts. Same as HEBR 2350. Approved for arts and sciences core curriculum: human diversity.

**JWST 2502-3. Representing the Holocaust.** Examines how the memory of the Holocaust in Nazi Germany is increasingly determined by the means of its representation, e.g., film, autobiography, poetry, architecture. Same as GRMN 2502. Approved for arts and sciences core curriculum: ideals and values.

**JWST 2551-3. Jewish World Literature: Modern to Contemporary.** Studies the literary expression of Jewish writers throughout the world in English translation. Gives special attention to questions of secularity versus tradition, identity, cultural change, diaspora and exile. Taught in English. Same as HEBR 2551.

**JWST 2600-3. Judaism, Christianity, and Islam.** Introduces literature, beliefs, practices, and institutions of Judaism, Christianity, and Islam, in historical perspective. Same as RLST 2600. Approved for arts and sciences core curriculum: ideals and values.

**JWST 3100-3. Judaism.** Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions. Same as RLST 3100. Approved for arts and sciences core curriculum: historical context.

**JWST 3202-3. Women, Gender, and Sexuality in Jewish Texts and Traditions.** Examines some of the ways Jewish texts and traditions look at women, gender and sexuality from biblical times to the present. Starts with an analysis of the positioning of the body, matter and gender in creation stories, moves on to the gendered aspects of tales of rescue and sacrifice, biblical tales of sexual subversion and power, taboo-breaking and ethnos building, to rabbinic attitudes towards women, sexuality and gender and contemporary renderings and rereadings of the earlier texts and traditions. Same as HEBR 3202. Approved for arts and sciences core curriculum: human diversity.

**JWST 3312-3. The Bible as Literature.** Surveys literary achievements of the Judeo-Christian tradition as represented by the Bible. Restricted to sophomores/juniors/seniors. Same as ENGL 3312.

**JWST 3401-3. The Heart of Europe: Filmmakers and Writers in 20th Century Central Europe.** Surveys the major works of 20th century central and central east European film and literature. Examines cultural production in the non-imperial countries and non-national languages of the region including Yiddish, Belarusian, Czech, Hungarian, Polish and Romanian, among others. Traces the rise of nationalism over the course of the century from the age of empires through the "Cold War." Same as GSLL 3401.

**JWST 3501-3. German-Jewish Writers: From the Enlightenment to the Present.** Provides insight into the German-Jewish identity through essays, autobiographies, fiction, and journalism from the Enlightenment to the post-Holocaust period. Examines the religious and social conflicts that typify the history of Jewish existence in German-speaking lands during the modern epoch. Same as GRMN 3501. Approved for arts and sciences core curriculum: human diversity.

**JWST 3677-3. Jewish-American Literature.** Explores the Jewish-American experience from the 19th century to the present through writers such as Sholem Aleichem, Peretz, Babel, Singer, Malamud, Miller, Ginsberg, and Ozick. The Jewish experience ranges from the travails of immigration to the loss of identity through assimilation. Restricted to sophomores/juniors/seniors. Same as ENGL 3777. Approved for arts and sciences core curriculum: human diversity.

**JWST 3901-3. Internship in Jewish Studies.** Learn beyond the classroom by interning in a local non-profit organization that connects with the Program

in Jewish Studies through its mission and/or program. Interns will be supervised by the faculty member or record as well as the employer housing the intern. Prereqs., HEBR/JWST 2350 or HIST/JWST 1108. May be repeated up to 6 total credit hours.

**JWST 4101-3. Topics in Hebrew Studies.** Explores topics in Hebrew and Jewish literature and culture. These may include topics such as diasporic literatures, Jewish artists and thinkers, courses on specific authors, figures or communities. Topics change each semester. May be repeated up to 9 total credit hours. Same as HEBR 4101.

**JWST 4348-3. Topics in Jewish History.** Covers topics in Jewish history from biblical beginnings to present day. Topics vary each semester. Consult the on-line Schedule Planner for specific topics. May be repeated up to 6 total credit hours within the degree. Restricted to sophomores/juniors/seniors. Same as HIST 4348.

**JWST 4544-3. History of Yiddish Culture.** Jews have produced culture in Yiddish, the vernacular language of eastern European Jewry, for 1000 years and the language continues to shape Jewish culture today. In this course, we will look at the literature, film, theater, music, art, sound, and laughter that defined the culture of eastern European Jewry and, in the 20th century, Jews around the world. Recommended prereqs., HIST 1108 or HEBR 2350. Same as HIST 4544.

**JWST 4580-3. The Holocaust: An Anthropological Perspective.** Focuses on the Holocaust during the Third Reich, which involved the murder of millions of people, including six million Jews. Reviews the Holocaust's history, dynamics, and consequences as well as other genocides of the 20th century, using an anthropological approach. Restricted to juniors/seniors. Same as ANTH 4580.

## Lesbian, Gay, Bisexual, and Transgender Studies

**LGBT 2000-3. Introduction to Lesbian, Gay, Bisexual, and Transgender Studies.** Investigates the social and historical meanings of racial, gender, and sexual identities and their relationship to contemporary lesbian, bisexual, gay, and transgender communities. Same as WMST 2030. Approved for arts and sciences core curriculum: human diversity.

**LGBT 2707-3. Introduction to Lesbian, Bisexual, and Gay Literature.** Offers students at sophomore and junior levels an introduction to some of the forms, concerns, and genres of contemporary lesbian, bisexual, transgender, and gay writing in English. Prereq., sophomore standing. Same as ENGL 2707.

**LGBT 3796-3. Queer Theory.** Surveys theoretical, critical, and historical writings in the context of lesbian, bisexual, transgender, and gay literature. Examines relationships among aesthetic, cultural, and political agendas, and literary and visual texts of the 20th century. Prereq., sophomore standing. Same as ENGL 3796.

**LGBT 4287-3. Studies in Lesbian, Gay, Bisexual, and Transgender Literature.** Examines selected British, American, and French literary representations of lesbian and gay identity from the early 16th century to the present. Discusses the changing status of alternate sexuality as a literary and cultural topos, including how same-sex desire is defined, and the rhetorical and ideological difficulties involved in its representation. Specific topics vary each semester. May be repeated up to 9 total credit hours. Restricted to juniors and seniors. Same as ENGL/WMST 4287.

## Libby Residential Academic Program

**LIBB 1500-3. The Dialogue of Art and Religion.** Focuses on interdisciplinary study of visual art from diverse cultural traditions. Addresses role and training of the artist; aesthetic issues related to the object; the audience or viewer for which the work is intended; and the context of the work, especially religious and social history. Cultural traditions include Russian Orthodox icons, Himalayan Buddhist thangka, and Navaho sandpaintings. (In different semesters, the content may shift to include other traditions such as Islamic or Celtic manuscripts, or Haida totem poles.) Approved for arts and sciences core curriculum: ideals and values. Restricted to Libby RAP students.

**LIBB 1600-3. Gender and Film.** Explores a wide variety of cinematic forms and styles and discusses the treatment of femininity, masculinity, sexuality, and how gender is represented as an artifact of mass culture. Although the course title privileges issues of gender, the course also includes the study of issues of race and ethnicity in film and the inherent connections between the cinematic representations of race and gender. Approved for arts and sciences core curriculum: human diversity. Restricted to Libby RAP students.

**LIBB 1700-3. The History of Communication from Caves to Cyberspace.** Surveys the history, evolution, and nature of communication and communication technologies. Students learn about the ongoing media revolution and its broader context, considering the interdependence of communication, culture, and society. They critically examine utopian, deterministic, and pessimistic arguments about the influence of new technologies and arts. Course combines lecture, discussion, and group work in a seminar format. Approved for arts and sciences core curriculum: historical context. Restricted to Libby RAP students.

**LIBB 2013-3. Film and the Quest for Truth.** Concerns the subjectivity and relativity of truth. Focuses on how and why we pursue (or fail to pursue) the truths about ourselves and about the people and events around us, and how and why such truths are often elusive, fragmentary, and impermanent. Formerly FILM 2013. Approved for arts and sciences core curriculum: ideals and values. Restricted to Libby RAP students.

**LIBB 2500 (1-3). Special Topics in Libby Residential Academic Program.** Introduces timely studio subjects in the visual and performing arts that cannot be offered on a regular basis. Information concerning the studio topics offered in any given semester is available prior to registration from the Libby RAP. May be repeated up to 7 total credit hours. Restricted to Libby RAP students.

**LIBB 2510 (1-3). Special Topics in Libby Residential Academic Program.** Introduces timely subjects in the visual and performing arts that cannot be offered on a regular basis. Information concerning the seminar topics offered in any given semester is available prior to registration from the Libby RAP. May be repeated up to 7 total credit hours. Restricted to Libby RAP students.

## Library Research

**LIBR 2000-3. Research Strategies on the Electronic Campus.** Critical examination and practical exploration of computer technologies, digital communication, and electronic information systems and services for new students. Restricted to freshmen and sophomores only.

**LIBR 3010-3. Methods of Electronic Library Research.** Exploration of the structure, organization, retrieval, and evaluation of electronic information sources through the formulation of search strategies useful for undergraduate research.

**LIBR 3900 (1-3). Independent Library Research.** In-depth library research project for upper-division students. Prereq., instructor consent.

**LIBR 4900 (1-3). Independent Library Research.** In-depth library research project for upper-division students. Prereq., instructor consent.

## Linguistics

**LING 1000-3. Language in U.S. Society.** Nontechnical exploration of the ways that language is used in America. Emphasizes language as a social institution and how values and goals of both public institutions and private groups shape and are shaped by language and its use. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: United States context or contemporary societies.

**LING 1010-3. The Study of Words.** Study of English words of Latin and Greek origin, focusing on etymological meaning by analysis of component parts (prefixes, bases, suffixes) and on the ways in which words have changed and developed semantically. Same as CLAS 1010.

**LING 1500-3. Understanding Grammar.** Presents fundamentals of grammar in the Western tradition. Emphasizes making concepts and uses of grammar (as exemplified in English and closely related foreign languages) understandable to the nonspecialist.

**LING 1900-1. Service Learning Practicum: Adult Literacy.** Practicum for selected students in LING 1000. Provides practical experience of the impact of illiteracy on individuals, families, and the community at large. Coregistration in service learning recitation is required. Coreq., LING 1000.

**LING 2000-3. Introduction to Linguistics.** Introduces the study of languages as structural systems. Principles of sound patterns, word formation, meaning, and sentence structure. Gives attention to language acquisition, psycholinguistics, language families, dialects, historical change in languages, and different language types. Meets MAPS requirement for social science: general.

**LING 2400-3. Language and Gender.** Familiarizes students with the effects of gender on language use; discusses popular beliefs and scholarly theories about language and communication. Provides students with tools for exploring the role of language and gender. Approved for arts and sciences core curriculum: human diversity.

**LING 3005-3. Cognitive Science.** Same as PSYC 3005, PHIL 3310, and CSCI 3702.

**LING 3100-3. Language Sound Structures.** Introduces the sounds of languages and their organization into phonological structures. Prereq., LING 2000 or equivalent.

**LING 3220-3. American Indian Languages in their Social and Cultural Context.** A sampling of the many languages and cultures found in America before Columbus. Emphasizes those living in what eventually became the United States, but also gives attention to the languages and higher civilizations of Latin America. Prereq., junior standing. Approved for arts and sciences core curriculum: human diversity.

**LING 3430-3. Semantics.** Theoretical and practical study of meaning in natural language. Considers both semantic theories and semantic phenomena from diverse languages. Does not treat techniques for improving the use of language. PRERQ., LING 2000 or equivalent.

**LING 3500-3. Language and the Public Interest.** Studies language in public and private use, concentrating on semantic devices as found in language of political propaganda, advertising, business, and government, as well as everyday use of language between people.

**LING 3545-3. World Language Policies.** Examines the economic and sociopolitical impact of choosing English vs. other languages in the U.S. Introduces the study of language policies, rights, and planning in other countries, including the worldwide use of English in social, business, and legal contexts.

**LING 3800 (1-4). Special Topics in Linguistics.** Intensive study of a selected area or problem in linguistics. May be repeated up to 9 total credit hours.

**LING 4100-3. Perspectives on Language.** Provides extended critical examination of a few selected issues, chosen each term for their general interest and relevance, e.g., the relation between language and thought, or human language vs. animal languages, and computer languages. Prereqs., LING 2000 or equivalent, and junior or senior standing.

**LING 4220-3. Language and Mind.** Studies processes of perceiving speech, interpreting it as meaningful, and expressing intentions to communicate as utterances. Emphasizes roles of the brain and of perceptual and motor systems. Writing, gestural, and animal communicative systems also are treated. Prereqs., PSYC 1001 and LING 2000. Same as PSYC 4220.

**LING 4420-3. Morphology and Syntax.** Introduces principles of word formation and sentence structure. Covers major morphological and syntactic structures found in the world's languages, and methods for describing grammatical structures, and includes practice in analyzing data from a variety of languages. Prereq., LING 2000 or equivalent. Same as LING 5420.

**LING 4560-3. Language Development.** Emphasizes acquisition of language by young children; development in later years and into adulthood is also treated. Particular attention given to roles of environment and of neurophysiological endowment in learning to communicate with words, sentences, and narratives. Prereqs., LING 2000 and PSYC 1001. Same as SLHS 4560 and PSYC 4560.

**LING 4610-3. English Structure for Teachers of English to Speakers of Other Languages.** Description of morphological and syntactic categories and structures of English. Prereq., LING 2000. Same as LING 5610.

**LING 4800-3. Language and Culture.** Principles of language structure and how language and culture interrelate; how language and language use are affected by culture; and how culture may be affected by use of, or contact with, particular languages. Prereq., junior standing. Same as ANTH 4800.

**LING 4830-3. Honors Thesis.** Required for students who elect departmental honors. Students write an honors thesis based on independent research under the direction of a faculty member. May be repeated up to 7 total credit hours.

**LING 4900 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**LING 5030-3. Linguistic Phonetics.** Introduces practical and theoretical aspects of phonetics. Provides training in recognition and production of speech sounds, and instruction on fundamentals of articulatory, acoustic, and auditory phonetics.

**LING 5200-3. Introduction to Computational Corpus Linguistics.** Covers computer methods for doing linguistics with on-line corpora. Includes extensive introduction (with lab) to the Python programming language, UNIX corpus tools, concordance programs, syntactic treebanks, probanks, and corpora for discourse and phonology research. Restricted to graduate students or instructor consent required.

**LING 5300-3. Research in Psycholinguistics.** After a general introduction to issues and research methods in psycholinguistics (language production and comprehension, language and cognition, language acquisition), several major current research topics, such as models of speech production, and theories of brain specialization for language, are explored. Prereq., at least one graduate-level course in linguistics, psychology, or computer science. Same as PSYC 5300.

**LING 5410-3. Phonology.** Studies sound systems of language. Introduces both principles of organization of sound systems and major kinds of phonological structures found worldwide. Provides extensive practice in applying phonological principles to data analysis. Prereq., LING 5030 or instructor consent.

**LING 5420-3. Morphology and Syntax.** Same as LING 4420.

**LING 5430-3. Semantics and Pragmatics.** Explores fundamental concepts of semantics and pragmatics, including theories of communication and meaning, representation, conversational implications, speech acts, and discourse structure. Prereq., LING 5420 or instructor consent.

**LING 5570-3. Introduction to Diachronic Linguistics.** Familiarizes students with terminology, methods, and theories dealing with phenomena of language change through time. Prereq., LING 5410 or instructor consent.

**LING 5610-3. English Structure for Teachers of English to Speakers of Other Languages.** Prereq., graduate standing. Same as LING 4610.

**LING 5620-3. Teaching ESL Pronunciation.** Examines the phonetics and phonology of American English (including prosody) and explores techniques for teaching pronunciation skills to non-native speakers. Treats both general issues and specific problems for students from particular language backgrounds. Prereq., LING 3100 or LING 5030 and 5410.

**LING 5630-3. Methods and Materials for Teaching English as an Additional Language.** Provides an overview of methods and materials for teaching English as an additional language, along with opportunities for students to observe, discuss and analyze these in relation to language teaching principles, linguistic considerations, and global and local contexts. Aimed primarily at the teaching of English to nonnative speaking adults, the course also addresses second and foreign language teaching generally. Recommended prereqs., LING 5610 or 5620.

**LING 5832-3. Natural Language Processing.** Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs. Prereq., graduate standing or instructor consent. Same as CSCI 5832.

**LING 5900 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**LING 5910 (1-3). TESOL Practicum.** Provides observation and supervised teaching experiences in classroom and other contexts involving the teaching of English to speakers of other languages, especially adults and young adult learners in settings outside K-12. Meetings provide opportunities to debrief

and to consult on teaching practice; help students connect theory, methods and practice; and support a professional teaching portfolio process. May be repeated up to 6 total credit hours. Prereq., LING 4610/5610 or instructor consent.

**LING 6200-3. Issues and Methods in Cognitive Science.** Same as CSCI 6402, EDUC 6504, PHIL 6310, and PSYC 6200.

**LING 6300-3. Topics in Language Use.** Discusses current issues and research in a selected area related to language use and function. Sample topics include conversational interaction, language policy, language content, and sociolinguistic variation.

**LING 6310-3. Sociolinguistic Analysis.** Serves as an advanced introduction to the empirical and theoretical foundations of contemporary sociolinguistic analysis, with special emphasis on linguistic variation, diversity and change.

**LING 6320-3. Linguistic Anthropology.** Serves as an advanced introduction to the empirical and theoretical foundations of contemporary linguistic anthropology, with special emphasis on the ways in which culture and society emerge semiotically through language and discourse. Same as ANTH 6320.

**LING 6450-3. Syntactic Analysis.** Introduces the major constructs used by formal theories of syntax to capture the relationship between meaning and syntactic form and uses data from diverse languages to explore the universality of these constructs. Restricted to graduate students.

**LING 6510-3. Language Structures.** Surveys the structure of one or more languages, emphasizing understanding how parts of the language interact. Designed to supplement courses in which parts of languages are used to illustrate theoretical claims. Prereqs., LING 5410 and 5420.

**LING 6520-3. Topics in Comparative Linguistics.** Students compare and contrast selected structures of languages treated from a typological, genetic, or areal perspective. No special prior knowledge of the subject language is required. Prereqs., LING 5410, 5420, and 5570, or equivalent.

**LING 6560-3. Language Acquisition.** Theories and research methods in first-language acquisition of phonology, morphology, syntax, semantics, and pragmatics. Prereqs., LING 5410, 5420, and 5430, or instructor consent.

**LING 6940 (1-3). Master's Degree Candidate.**

**LING 6950 (1-6). Master's Thesis.**

**LING 7000-3. Methods of Typological Research 1.** Research practicum that provides experience in discovering generalizations about language from observations over a sample of individual languages. Students practice the steps in such research from formulation of research questions to preliminary sketch of results under close faculty supervision. Prereqs., LING 5410, 5420, and 5570; or equivalent.

**LING 7030-3. Phonetic Theory and Analysis.** Provides students with the practical skills and the conceptual framework to do independent research in phonetics (or in other areas relying on phonetic data). Introduces current and traditional issues in phonetic research (both experimental and theoretical) and gives training in analytical methods. Prereqs., LING 5030 and 5410 or equivalent.

**LING 7100-3. Field Methods 1.** Introduces the process of discovering structure of a language from data obtained directly from its speakers. Emphasizes effectiveness in the field context, rapid recognition of structural features, and preliminary formulation using computational tools. Prereqs., LING 5410 and 5420, or equivalent.

**LING 7320-3. Narrative and Identity.** Examines the ways in which identities are constructed, contested, and negotiated through narrative practice.

**LING 7350-3. Language and Gender in Cultural Perspective.** Examines organizations of language and gender in a variety of societies and cultures from the perspectives of sociolinguistics, linguistic anthropology, and socially-oriented discourse analysis.

**LING 7360-3. Language and Sexuality.** Explores the role of language in the social construction and articulation of sexuality.

**LING 7410-3. Phonological Theory.** Phonetic and morphophonological representations: distinctive features, segments, prosodic structures, morphological structures. Phonological processes and their interaction. Naturalness conditions. Prereq., LING 5410 or equivalent.

**LING 7415-2. Cognitive Science Research Practicum.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as PSYC 7415, CSCI 7412, and EDUC 6506.

**LING 7420-3. Syntactic Theory.** Covers various topics in syntactic theory. May be repeated up to 9 total credit hours with instructor consent. Prereq., LING 5420 or equivalent.

**LING 7425-2. Cognitive Science Research Practicum 2.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506. Same as PSYC 7425, CSCI 7422, and EDUC 6516.

**LING 7430-3. Semantic Theory.** Current developments in the theory of linguistic semantics. Topics include truth-conditional theories, generative linguistic theories, semantic theories of communicative competence, and integration of these theories in development of a combined theory of semantics and pragmatics. Prereq., LING 5430 or instructor consent.

**LING 7570-3. Advanced Diachronic Linguistics.** Presents theories of language change. Discusses mechanisms of language change, its trajectories over linguistic categories and items, and its relation to theories of grammar and of language variation. Prereqs., LING 5410, 5420, and 5570, or equivalent.

**LING 7762 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Prereq., graduate standing. Same as CSCI 7762, EDUC 6505, and PSYC 7765.

**LING 7775 (1-2). Topics in Cognitive Science.** Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in ICS Cognitive Science Academic Programs. Same as PSYC 7775, CSCI 7772, EDUC 7775 and SLHS 7775.

**LING 7800-3. Open Topics in Linguistics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. Contact the department office for information. Prereq., instructor consent.

**LING 7900 (1-3). Independent Study.** May be repeated up to 7 total credit hours.

**LING 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

### *English as a Second Language*

*(Administered by the International English Center)*

*For additional information regarding English as a second language courses, see International English Center in the General Information section.*

**ESLG 1130-2. Accent Reduction for Foreign Students.** Provides oral activities with authentic English materials to reduce accents and to increase intelligibility for U.S. academic situations. Evaluates individual problem areas and includes one-on-one meetings with the native-speaker instructor. Improves overall articulation and fluency. Does not fulfill humanities or major requirements.

**ESLG 1210-2. Academic Writing for Foreign Students.** Addresses the development of paragraphs and full-length essays. Focus areas include organization and style, grammar and vocabulary, and conventions of academic writing, including incorporating the ideas of others and citing sources appropriately. Extensive instructor feedback provided. Improves fluency and precision in academic writing. Does not fulfill humanities or major requirements.

**ESLG 1222-2. Advanced Written Composition for Foreign Students.** Continued practice in academic writing, including incorporating the ideas of others and citing sources appropriately. Extensive instructor feedback provided. Preparation, writing, and revising of a full-length academic term/research paper or work on chapters for a master's thesis or doctoral dissertation. Does not fulfill humanities or major requirements. Prereq., ESLG 1210 or instructor consent.

## Mathematics

*After completing one semester of calculus with a grade of C (2.000) or better, no math major may receive credit in any mathematics course numbered below 1300. No student may obtain more than 9 hours of credit in mathematics courses numbered below 1300. A grade of C- or above is required for all prerequisite courses.*

**MATH 1005-3. Introduction to College Mathematics.** Introductory level mathematics course which presents a college level introduction to algebraic functions and their applications. Student with credit for MATH 1005 receives only one additional hour of credit for MATH 1001, 1011 or 1012 or two additional hours of credit for MATH 1150. Course is only offered through the Student Academic Service Center. Meets MAPS requirement for mathematics.

**MATH 1011-3. Fundamentals and Techniques of College Algebra.** Covers simplifying algebraic expressions, factoring linear and quadratic equations, inequalities, exponentials, logarithms, functions, and graphs, and systems of equations. Credit not granted for this course and MATH 1010, 1020, and 1150. Prereq., one year high school algebra or placement exam score for MATH 1000. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1012-3. Quantitative Reasoning and Mathematical Skills.** Promotes mathematical literacy among liberal arts students. Teaches basic mathematics, logic, and problem-solving skills in the context of higher level mathematics, science, technology, and/or society. This is not a traditional math class, but is designed to stimulate interest in and appreciation of mathematics and quantitative reasoning as valuable tools for comprehending the world in which we live. Credit not granted for this course and QRMS 1010. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: mathematical skills.

**MATH 1021-2. Numerical and Analytical College Trigonometry.** Covers trigonometric functions, identities, solutions of triangles, addition and multiple angle formulas, inverse and trigonometric functions, and laws of sines and cosines. Credit not granted for this course and MATH 1150, 1030 or 1040. Prereqs., MATH 1011 or 1020, or placement exam score for MATH 1030, or 1 1/2 years or high school algebra and 1 year of high school geometry.

**MATH 1071-3. Finite Mathematics for Social Science and Business.** Discusses systems of linear equations and introduces matrices, linear programming, and probability. Prereq., MATH 1011 or 1000, placement exam score for MATH 1020, or one and a half years of high school algebra. Credit not granted for this course and MATH 1050, 1060 and 1070. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1081-3. Calculus for Social Science and Business.** Covers differential and integral calculus of algebraic, logarithmic, and exponential functions. Prereq., MATH 1011, 1071, 1010, or 1070 or placement exam score for MATH 1020 or two years high school algebra. Credit not granted for this course and MATH 1080, 1090, 1100, 1300, 1310, APPM 1350, and ECON 1088. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1110-3. The Spirit and Uses of Mathematics 1.** For liberal arts students and prospective elementary teachers. Includes a study of problem-solving techniques in mathematics, the uses and role of mathematics in our society, and the structure of our familiar number systems. Additional topics are chosen from number theory, ancient numeration systems, computer science,

modern geometry and algebra, and elementary logic. Prereq., one year of high school algebra and one year of plane geometry. The combination MATH 1110 and 1120 is approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1120-3. The Spirit and Uses of Mathematics 2.** Continuation of MATH 1110. Prereq., one year of high school algebra and one year of plane geometry. The combination MATH 1110 and 1120 is approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1130-3. Mathematics from the Visual Arts.** Introduces mathematical concepts through the study of visual arts. In practicum and lectures, students study the symmetry groups of patterns, shibori-like paper cuttings, origami, and mandalas. Also studied are Euler's characteristics, perspective, golden ratio, computer art, and fractals. Credit not granted for this course and QRMS 1130. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1150-4. Precalculus Mathematics.** Develops techniques and concepts prerequisite to calculus through the study of trigonometric, exponential, logarithmic, polynomial, and other functions. Prereq., one and a half years of high school algebra. Students having credit for college algebra and trigonometry may not receive additional credit for MATH 1150. Students with credit for college algebra receive only 2 additional hours of credit for MATH 1150. Similar to MATH 1000, 1010, 1020, 1011, 1021, 1030, and 1040. Meets MAPS requirement for mathematics. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1300-5. Analytic Geometry and Calculus 1.** Topics include limits, derivatives of algebraic and trigonometric functions, applications of the derivative, integration and application of the definite integral. Prereqs., two years high school algebra, one year geometry, and 1/2 year trigonometry or MATH 1150. Credit not granted for this course and MATH 1081, 1310, APPM 1345, 1350, and ECON 1088. Similar to MATH 1080, 1090, and 1100. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1310-5. Calculus 1 with Biological Applications.** The topics, prerequisites, and credit restrictions are the same as for MATH 1300, but a greater emphasis is placed on synthesizing the geometric, numerical, and algebraic aspects of each concept and on exploring "real world" applications of calculus. Especially recommended for biology majors. Prereq., 2 years high school algebra, 1 year geometry, and 1/2 year trigonometry, or MATH 1150. Credit not granted for this course and MATH 1080, 1081, 1090, 1100, 1300, APPM 1350, or ECON 1088. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 1410-3. Mathematics for Secondary Educators.** Assists students in meeting state mathematics certification requirements. Topics include problem solving, number systems, geometry and measurement, probability and statistics. Enrollment is restricted to students already admitted to or intending to apply for admission to the secondary teacher education program. Prereqs., one year high school algebra, one year geometry. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 2001-3. Introduction to Discrete Mathematics.** Introduces the ideas of rigor and proof through an examination of basic set theory, quantification theory, elementary counting, discrete probability, and additional topics. Prereq., MATH 1300 or APPM 1350.

**MATH 2300-5. Analytic Geometry and Calculus 2.** Continuation of MATH 1300. Topics include transcendental functions, methods of integration, polar coordinates, conic sections, improper integrals, and infinite series. Prereq., Calculus 1. Credit not granted for this course and MATH 1320 or APPM 1360.

**MATH 2380-3. Mathematics for the Environment.** An interdisciplinary course where analysis of real phenomena such as acid rain, population growth, and road-killed rabbits in Nevada leads to consideration of various fundamental concepts in mathematics. One-third of the course consists of individual projects chosen by students. Prereq., proficiency in high school mathematics. Credit not granted for this course and QRMS 2380. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**MATH 2400-4. Analytic Geometry and Calculus 3.** A continuation of Calculus 2. Topics include vectors, three-dimensional analytic geometry, partial differentiation and multiple integrals, and vector analysis. Prereq., Calculus 2. Credit not granted for this course and APPM 2350.

**MATH 2510-3. Introduction to Statistics.** Elementary statistical measures. Introduces statistical distributions, statistical inference, and hypothesis testing. Prereq., two years of high school algebra. Credit not granted for this course and MATH 4570/5570 or MATH 3510.

**MATH 2520-3. Introduction to Biometry.** Introduces the concepts of randomness, confidence and hypothesis tests, then applies these ideas to analysis of variance, linear regression and correlation, all in the context of biology. Credit not granted for this course and any of MATH 2510, 4520, or APPM 4570/5570. Prereq., MATH 1300 or 1310 or APPM 1350.

**MATH 3001-3. Analysis 1.** Provides a rigorous treatment of the basic results from elementary Calculus. Topics include the topology of the real line, sequences of numbers, continuous functions, differentiable functions, and the Riemann integral. Prereq., MATH 2001, 3000, or 3200.

**MATH 3110-3. Introduction to Theory of Numbers.** Studies the set of integers, focusing on divisibility, congruences, arithmetic functions, sums of squares, quadratic residues and reciprocity, and elementary results on distributions of primes. Prereq., MATH 2001. Offered each spring.

**MATH 3120-3. Functions and Modeling.** Engages the students in lab-based activities designed to strengthen and expand knowledge of the topics in secondary mathematics, focusing especially on topics from Precalculus and Calculus. The labs will involve the use of multiple representations, transformations, data analysis techniques, and interconnections among geometry, probability and algebra. A recurrent theme will be building relationships between discrete and continuous reasoning. Prereqs., Calculus I, MATH 2001, or instructor consent.

**MATH 3130-3. Introduction to Linear Algebra.** Examines basic properties of systems of linear equations, vector spaces, linear independence, dimension, linear transformations, matrices, determinants, eigenvalues, and eigenvectors. Prereq., MATH 2300 or APPM 1360. Credit not granted for this course and APPM 3310.

**MATH 3140-3. Abstract Algebra 1.** Studies the elementary theory of groups, rings, fields, polynomials, group and ring homomorphisms, and isomorphisms. Prereq., MATH 2001 and 3130.

**MATH 3170-3. Combinatorics 1.** Covers basic methods and results in combinatorial theory. Includes enumeration methods, elementary properties of functions and relations, and graph theory. Emphasizes applications. Prereq., MATH 2001.

**MATH 3210-3. Euclidean and Non-Euclidean Geometry.** Axiomatic systems. Foundations of Euclidean and Lobachevskian geometries. Prereq., MATH 2001 and 3130.

**MATH 3510-3. Introduction to Probability and Statistics.** Introduces the basic notions of Probability: random variables, expectation, conditioning, and the standard distributions (Binomial, Poisson, Exponential, Normal). This course also covers the Law of Large Numbers and Central Limit Theorem as they apply to statistical questions: sampling from a random distribution, estimation, and hypothesis testing. Prereqs., MATH 2001 and 2300 or APPM 1360. Credit not granted for this course and MATH 2510 or 4510.

**MATH 3850-1. Seminar in Guided Mathematics Instruction.** Provides Learning Assistants with an opportunity to analyze assessment data for formative purposes, and develop instructional plans as a result of these analyses. These formative assessment analyses will build on the literature in the learning sciences. Students will gain direct experiences interacting with the tools of the trade, especially with actual assessment data and models of instruction. May be repeated up to 3 total credit hours. Restricted to Learning Assistants in MATH. Coreq., EDUC 4800.

**MATH 4000-3. Foundations of Mathematics.** Focuses on a complete deductive framework for mathematics and applies it to various areas. Presents Goedel's famous incompleteness theorem about the inherent limitations of mathematical systems. Uses idealized computers to investigate the capabilities and limitations of human and machine computation. Prereq., MATH 2001 plus one of 3001, 3130, 3140, or 3210.

**MATH 4001-3. Analysis II.** Provides a rigorous treatment of infinite series, sequences of functions, and an additional topic chosen by the instructor (for example, multivariable analysis, the Lebesgue integral, or Fourier analysis). Prereqs., MATH 3001 and 3130.

**MATH 4120-3. Introduction to Operations Research.** Studies linear and non-linear programming, the simplex method, duality, sensitivity, transportation, and network flow problems, some constrained and unconstrained optimization theory, and the Kuhn-Tucker conditions, as time permits. Prereqs., MATH 3130 or APPM 3310. Same as MATH 5120 and APPM 4120.

**MATH 4140-3. Abstract Algebra 2.** Covers group actions, Sylow theory, Field theory, and some Galois theory. Prereq., MATH 3140.

**MATH 4200-3. Introduction to Topology.** Introduces the basic concepts of point set topology. Includes topological spaces, metric spaces, homeomorphisms, connectedness, and compactness. Prereqs., MATH 3001 or MATH 4310.

**MATH 4210-3. Euclidean and Non-Euclidean Geometry II.** Continues the study of Euclidean and non-Euclidean geometry from MATH 3210 and examines a more advanced topic from geometry chosen by the instructor (e.g., projective geometry or three-dimensional geometry). Prereq., MATH 3120.

**MATH 4230-3. Geometry of Curves and Surfaces.** Introduces the modern differential geometry of plane curves, space curves, and surfaces in space. Computers are used, but no prior knowledge of computer programming is required. Prereqs., Calculus 3 and MATH 3130.

**MATH 4320-3. Multivariable Analysis.** Instructs students in calculus of several variables. Topics include continuity, differentiation and integration, implicit function theorem, inverse function theorem, and if time permits, Fourier series. Prereqs., MATH 4310, and MATH 3130 or APPM 2360.

**MATH 4330-3. Fourier Analysis.** The notion of Fourier analysis, via series and integrals, of periodic and nonperiodic phenomena is central to many areas of mathematics. Develops the Fourier theory in depth, and considers such special topics and applications as wavelets, Fast Fourier Transforms, seismology, digital signal processing, differential equations, and Fourier optics. Prereq., MATH 3001 or instructor consent. Same as MATH 5330.

**MATH 4430-3. Ordinary Differential Equations.** Involves an elementary systematic introduction to first-order scalar differential equations,  $n$ th order linear differential equations, and  $n$ -dimensional linear systems of first-order differential equations. Additional topics are chosen from equations with regular singular points, Laplace transforms, phase plane techniques, basic existence and uniqueness, and numerical solutions. Prereqs., Calculus 3, and MATH 3130 or APPM 2360 (min. grade C). Similar to APPM 2360.

**MATH 4440-3. Mathematics of Coding and Cryptography.** Gives an introduction, with proofs, to the algebra and number theory used in coding and cryptography. Basic problems of coding and cryptography are discussed; prepares students for the more advanced ECEN 5032 and 5682. Prereq., MATH 3130. Same as MATH 5440.

**MATH 4450-3. Introduction to Complex Variables.** Theory of functions of one complex variable, including integrals, power series, residues, conformal mapping, and special functions. Available fall semester only. Prereq., MATH 3001.

**MATH 4470-3. Partial Differential Equations 1.** Studies initial, boundary, and eigenvalue problems for the wave, heat, and potential equations. Solution by separation of variables, Green's function, and variational methods. Prereq., MATH 4430 or equivalent. Same as MATH 5470.

**MATH 4510-3. Introduction to Probability Theory.** Studies axioms, combinatorial analysis, independence and conditional probability, discrete and absolutely continuous distributions, expectation and distribution of functions of random variables, laws of large numbers, central limit theorems, and simple Markov chains. Prereqs., MATH 2400, or APPM 2350, and MATH 3130. Credit not granted for this course and APPM 3570, ECEN 3810, or MATH 3510.

**MATH 4520-3. Introduction to Mathematical Statistics.** Examines point and confidence interval estimation. Principles of maximum likelihood, sufficiency, and completeness: tests of simple and composite hypotheses, linear models, and multiple regression analysis. Analyzes variance distribution-free methods. Prereq., MATH 4510 or APPM 3570. Same as MATH 5520 and APPM 4520.

**MATH 4540-3. Introduction to Time Series.** Stresses basic properties, linear extrapolation, and filtering of stationary random functions. Topics also include spectral analysis and estimation of the power spectrum using computers. Prereqs., MATH 4510/APPM 3570 and MATH 4520/APPM 4520. Same as MATH 5540 and APPM 4540.

**MATH 4650-3. Intermediate Numerical Analysis 1.** Focuses on numerical solution of nonlinear equations, interpolation, methods in numerical integration, numerical solution of linear systems, and matrix eigenvalue problems. Stresses significant computer applications and software. Prereqs., APPM 3310 or MATH 3130, and knowledge of a programming language. Same as APPM 4650.

**MATH 4660-3. Intermediate Numerical Analysis 2.** Topics include solution of algebraic and transcendental equations, and linear and nonlinear systems of equations. Highlights interpolation, integration, solution of ordinary differential equations, least squares, sources of error and error analysis, computer implementation of numerical methods, matrix eigenvalue problems, and summation of infinite series. See also MATH 4650. Prereq., MATH 4650. Same as APPM 4660.

**MATH 4730-3. Set Theory.** Studies in detail the theory of cardinal and ordinal numbers, definition by recursion, the statement of the continuum hypothesis, simple cardinal arithmetic, and other topics chosen by the instructor. Prereq., MATH 2001 plus one upper-division MATH class.

**MATH 4820-3. History of Mathematical Ideas.** Examines the evolution of a few mathematical concepts (e.g., number, geometric continuum, or proof), with an emphasis on the controversies surrounding these concepts. Begins with Ancient Greek mathematics and traces the development of mathematical concepts through the middle ages into the present. Prereq., two upper division courses in mathematics. Recommended prereq., completion of upper division Written Communication requirement.

**MATH 4890 (1-3). Honors Independent Study.** Offered for students doing a thesis for departmental honors.

**MATH 4900 (1-3). Independent Study.**

## Graduate Courses

**MATH 5000-3. Foundations of Mathematics.** Focuses on foundations used in other graduate courses and for specialization in foundations. Includes equivalence relations, orderings, ordinal and cardinal numbers and arithmetic, axiom of choice; first-order logic, models, truth, compactness and completeness theorems, nonstandard analysis, and infinitesimals; and formulation of Goedel's incompleteness theorem. Prereqs., MATH 3130, 3140, and 4310. Undergraduates must have approval of the instructor.

**MATH 5030-3. Intermediate Mathematical Physics 1.** Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory, and Fourier analysis. Prereqs., MATH 4310 and 4320. Undergraduates must have approval of the instructor. Same as PHYS 5030.

**MATH 5040-3. Intermediate Mathematical Physics 2.** Surveys classical mathematical physics, starting with complex variable theory and finite dimensional vector spaces. Discusses topics in ordinary and partial differential equations, the special functions, boundary value problems, potential theory, and Fourier analysis. Prereq., MATH 5030. Undergraduates must have approval of the instructor. Same as PHYS 5040.

**MATH 5120-3. Introduction to Operations Research.** Prereq., MATH 3130 or APPM 3310. Undergraduates must have approval of the instructor. Same as MATH 4120, APPM 5120.

**MATH 5150-3. Linear Algebra.** Highlights vector spaces, linear transformations, eigenvalues and eigenvectors, and canonical forms. Prereq., MATH 3130. Undergraduates must have approval of the instructor.

**MATH 5330-3. Fourier Analysis.** Undergraduates must have approval of the instructor. Recommended prereq., MATH 5310. Same as MATH 4330.

**MATH 5430-3. Ordinary Differential Equations.** Introduces theory and applications of ordinary differential equations, including existence and uniqueness theorems, qualitative behavior, series solutions, and numerical methods, for scalar equations and systems. Prereqs., MATH 3130 and 4310. Undergraduates must have approval of the instructor.

**MATH 5440-3. Mathematics of Coding and Cryptography.** Undergraduates must have approval of the instructor. Prereq., MATH 3130. Same as MATH 4440.

**MATH 5470-3. Partial Differential Equations 1.** Prereq., MATH 4430. Undergraduates need instructor consent. Same as MATH 4470.

**MATH 5520-3. Introduction to Mathematical Statistics.** Prereq., MATH 4510 or APPM 3570. Undergraduates must have approval of the instructor. Same as MATH 4520 and APPM 5520.

**MATH 5540-3. Introduction to Time Series.** Prereqs., MATH 4510/APPM 3570 and MATH 4520/APPM 4520. Undergraduates must have approval of the instructor. Same as MATH 4540/APPM 5540.

**MATH 5600-3. Numerical Analysis 1.** Solution of nonlinear algebraic equations, interpolation, approximation theory, and numerical integration. Prereqs., APPM 3130 or MATH 3130, and experience with a scientific programming language. Undergraduates must have approval of the instructor.

**MATH 5610-3. Numerical Analysis 2.** Solution of linear systems, eigenvalue problems, optimization problems, and ordinary and partial differential equations. Prereq., MATH 5600 or APPM 5600. Undergraduates must have approval of the instructor.

**MATH 5905-1. Mathematics Teacher Training.** Designed to train students to become effective teachers. Students teach a mathematics course, meeting weekly with faculty to discuss problems particular to the teaching of mathematics. Prereqs., graduate standing and experience as a teaching assistant.

**MATH 6110-3. Introduction to Number Theory.** Examines divisibility properties of integers, congruencies, diophantine equations, arithmetic functions, quadratic residues, distribution of primes, and algebraic number fields. Prereq., MATH 3140. Undergraduates must have approval of the instructor.

**MATH 6130-3. Algebra 1.** Studies group theory and ring theory. Prereq., MATH 3140. Undergraduates need instructor consent.

**MATH 6140-3. Algebra 2.** Studies modules, fields, and Galois theory. Prereq., MATH 6130. Undergraduates need instructor consent.

**MATH 6150-3. Commutative Algebra.** Introduces topics used in number theory and algebraic geometry, including radicals of ideals, exact sequences of modules, tensor products, Ext, Tor, localization, primary decomposition of ideals, and Noetherian rings. Prereq., MATH 6140. Undergraduates must have approval of the instructor.

**MATH 6170-3. Algebraic Geometry.** Introduces algebraic geometry, including affine and projective varieties, rational maps and morphisms, and differentials and divisors. Additional topics might include Bezout's Theorem, the Riemann-Roch Theorem, elliptic curves, and sheaves and schemes. Prereq., MATH 6140. Undergraduates must have approval of the instructor.

**MATH 6180-3. Algebraic Number Theory.** Introduces number fields and completions, norms, discriminants and differentials, finiteness of the ideal class group, Dirichlet's unit theorem, decomposition of prime ideals in extension fields, decomposition, and ramification groups. Prereqs., MATH 6110 and 6140. Undergraduates must have approval of the instructor.

**MATH 6190-3. Analytic Number Theory.** Acquaints students with the Riemann Zeta-function and its meromorphic continuation, characters and Dirichlet series, Dirichlet's theorem on primes in arithmetic progressions, zero-free regions of the zeta function, and the prime number theorem. Prereqs., MATH 6110 and 6350. Undergraduates must have approval of the instructor.

**MATH 6210-3. Introduction to Topology 1.** Introduces elements of general topology, algebraic topology, and differentiable manifolds. See also MATH 6220. Prereqs., MATH 3130, 3140, 4310, and 4320. Undergraduates must have approval of the instructor.

**MATH 6220-3. Introduction to Topology 2.** Introduces elements of general topology, algebraic topology, and differentiable manifolds. See also MATH 6210. Prereq., MATH 6210. Undergraduates must have approval of the instructor.

**MATH 6230-3. Introduction to Differential Geometry 1.** Instructs students on fundamental concepts such as manifolds, differential forms, de Rham cohomology, Riemannian metrics, connections and curvatures, fiber bundles, complex manifolds, characteristic classes, and applications to physics. Prereqs., MATH 3130 and 4320. Undergraduates must have instructor consent.

**MATH 6240-3. Introduction to Differential Geometry 2.** Continuation of MATH 6230. Undergraduates must have instructor consent.



**MATH 6250-3. Theory of Rings.** Studies semi-simple Artinian rings, the Jacobson radical, group rings, representations of finite groups, central simple algebras, division rings and the Brauer group. Prereq., MATH 6130, 6140. Undergraduates must have approval of the instructor.

**MATH 6260-3. Geometry of Quantum Fields and Strings.** Focuses on differential geometric techniques in quantum field and string theories. Topics include spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory, and nonperturbative aspects in field and string theories. Prereq., MATH 6230, PHYS 5250, or instructor consent. Recommended prereqs., MATH 6240 and PHYS 7280. Undergraduates must have approval of the instructor. Same as PHYS 6260.

**MATH 6270-3. Theory of Groups.** Studies nilpotent and solvable groups, simple linear groups, multiply transitive groups, extensions and cohomology, representations and character theory, and the transfer and its applications. Prereq., MATH 6130. Recommended prereq., MATH 6140. Undergraduates must have approval of the instructor.

**MATH 6280-3. Advanced Algebraic Topology.** Covers homotopy theory, spectral sequences, vector bundles, characteristic classes, K-theory and applications to geometry and physics. Prereq., MATH 6220 or instructor consent. Undergraduates must have approval of the instructor.

**MATH 6310-3. Introduction to Real Analysis 1.** Presents the basic notions of analysis, e.g., limits, lim sup and lim inf, continuity, and the topology of the real line; develops the number theory of Lebesgue measure and the Lebesgue integral on the line, emphasizing the various notions of convergence and the standard convergence theorems. Applications are made to the classical  $L^p$  spaces. Prereq., MATH 4310 and 4320. Instructor consent required for undergraduates.

**MATH 6320-3. Introduction to Real Analysis 2.** Covers general metric spaces, the Baire Category Theorem, and general measure theory, including the Radon-Nikodym and Fubini theorems. Presents the general theory of differentiation on the real line and the Fundamental Theorem of Lebesgue Calculus. Prereq., Math 6310. Instructor consent required for undergraduates.

**MATH 6350-3. Functions of a Complex Variable 1.** Focuses on complex numbers and the complex plane. Includes Cauchy-Riemann equations, complex integration, Cauchy integral theory, infinite series and products, and residue theory. Prereq., MATH 4310. Undergraduates need instructor consent.

**MATH 6360-3. Functions of a Complex Variable 2.** Focuses on conformal mapping, analytic continuation, singularities, and elementary special functions. Prereq., MATH 6350. Instructor consent required for undergraduates.

**MATH 6534-3. Topics in Mathematical Probability.** Offers selected topics in probability such as sums of independent random variables, notions of convergence, characteristic functions, Central Limit Theorem, random walk, conditioning and martingales, Markov chains, and Brownian motion. Prereq., MATH 6310 or equivalent. Undergraduates must have approval of the instructor.

**MATH 6550-3. Introduction to Stochastic Processes.** Systematic study of Markov chains and some of the simpler Markov processes, including renewal theory, limit theorems for Markov chains, branching processes, queuing theory, birth and death processes, and Brownian motion. Applications to physical and biological sciences. Prereqs., MATH 4310, MATH 4510 or APPM 3570, or APPM 4560, or instructor consent. Undergraduates must have approval of the instructor. Same as APPM 6550.

**MATH 6730-3. Set Theory 1.** Presents cardinal and ordinal arithmetic, and basic combinatorial concepts, including stationary sets, generalization of Ramsey's theorem, and ultrafilters, consisting of the axiom of choice and the generalized continuum hypothesis. Prereqs., MATH 4000 and 4730, or MATH 5000, or instructor consent. Undergraduates need instructor consent.

**MATH 6740-3. Set Theory 2.** Presents independence of the axiom of choice and the continuum hypothesis, Souslin's hypothesis, and other applications of the method of forcing. Introduces the theory of large cardinals. Prereq., MATH 6730. Undergraduates need instructor consent.

**MATH 6900 (1-3). Independent Study.** Undergraduates must have approval of the instructor. May be repeated up to 6 total credit hours.

**MATH 6940 (1-6). Master's Degree Candidate.** This course is for students preparing for the no-thesis option for a master's degree. The content is set by the students' advisors.

**MATH 6950 (1-6). Master's Thesis.**

**MATH 8104-3. Modular Forms.** Introduces the upper-half plane and its geometry, modular forms, congruence subgroups, cusps, Fourier expansions, Theta series, Poincare series, Hecke operators, and relations to Dirichlet series. Prereqs., MATH 6130 and 6350. Undergraduates must have approval of the instructor.

**MATH 8114-3. Topics in Number Theory.** May include the theory of automorphic forms, elliptic curves, or any of a variety of advanced topics in analytic and algebraic number theory. Prereq., MATH 6110. Undergraduates must have approval of the instructor.

**MATH 8174-3. Topics in Algebra I.** Prereqs., MATH 6130 and 6140. Undergraduates must have approval of the instructor.

**MATH 8250-3. Mathematical Theory of Relativity 1.** Focuses on Maxwell equations, Lorentz force, Minkowski space-time, Lorentz, Poincare, and conformal groups, metric manifolds, covariant differentiation, Einstein space-time, cosmologies, and unified field theories. Prereq., instructor consent. Undergraduates must have approval of the instructor.

**MATH 8304-3. Topics in Analysis 1.** Presents advanced topics in analysis including Lie groups, Banach algebras, operator theory, ergodic theory, representation theory, etc. Prereqs., MATH 8330 and 8340, or instructor consent. Undergraduates must have approval of the instructor.

**MATH 8330-3. Functional Analysis 1.** Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations, and spectral theorem for bounded self-adjoint operators), and Banach algebras (the Gelfand theory). See also MATH 8340. Prereqs., MATH 6310 and 6320. Undergraduates must have approval of the instructor.

**MATH 8340-3. Functional Analysis 2.** Introduces such topics as Banach spaces (Hahn-Banach theorem, open mapping theorem, etc.), operator theory (compact operators and integral equations, and spectral theorem for bounded self-adjoint operators), and Banach algebras (the Gelfand theory). See also MATH 8330. Prereq., MATH 8330. Undergraduates must have approval of the instructor.

**MATH 8370-3. Harmonic Analysis 1.** Examines trigonometric series, periodic functions, diophantine approximation, and Fourier series. Also covers Bohr and Stepanoff almost periodic functions, positive definite functions, and the  $L_1$  and  $L_2$  theory of the Fourier integral. Applications to group theory and differential equations. See also MATH 8380. Prereq., MATH 5150 and 6320. Undergraduates must have approval of the instructor.

**MATH 8420-3. Mathematical/Computational Fluid Dynamics 2.** Mathematical treatment of basic Navier-Stokes partial differential equations describing fluid dynamics, including the Euler and Stokes equations as approximations for high and low speed flows. Emphasizes both analytical considerations and computational methods. Prereq., instructor consent. Undergraduates must have approval of the instructor.

**MATH 8714-3. Topics in Logic 1 and 2.**

**MATH 8815 (1-3). Ulam Seminar.** May be repeated up to 3 total credit hours.

**MATH 8900 (1-3). Independent Study.** Undergraduates must have approval of the instructor. May be repeated up to 6 total credit hours.

**MATH 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School portion of the catalog.

## Medieval and Early Modern Studies

**MEMS 2020-3. Introduction to Medieval and Renaissance Studies.** Introduces students to the literature, history, culture and art of Europe and the Mediterranean basin from late antiquity through the renaissance. The course is interdisciplinary and focuses on topics which reveal the dynamism and diversity of pre-modern culture. Formerly MEDV 2020.

**MEMS 4020-3. Medieval and Early Modern Studies: Texts and Contexts.**

Focuses on communities in the Mediterranean basin and Europe (i.e., cloister, court, and city), discussing major literary texts and visual monuments associated with them and their historical context. Emphasizes tensions between tradition and innovation, Latin and vernacular, East and West, Christian and non-Christian (Jewish and Islam), sacred and secular, authority and freedom, and male and female. Prereqs., CLAS 1110 and 1120, or ENGL 2222 and 2502, or HIST 1010 and 1020, or HUMN 1010 or 1020, or instructor consent. Same as MEMS 5020. Formerly MEDV 4020.

**MEMS 4030-3. Medieval and Early Modern Studies: Special Topics.** Different topics offered by the faculty of the Medieval and Early Modern Studies Program in alternate semesters. Topics may include the literature of pilgrimage and travel, women and minorities, theatre, music, epic, medieval and early modern views of the classics, the Bible, and medieval and early modern theories of education. Prereqs., CLAS 1110 and 1120, or ENGL 2222 and 2502, or HIST 1010 and 1020, or HUMN 1010 or HUMN 1020, or instructor consent. Same as MEMS 5030. Formerly MEDV 4030.

**MEMS 5020-3. Medieval and Early Modern Studies: Texts and Contexts.**

Prereq., graduate standing in comparative literature, theatre, classics, or instructor consent. Recommended prereq., ability to use literary texts in their original language. Same as MEMS 4020. Formerly MEDV 5020.

**MEMS 5030-3. Medieval and Early Modern Studies: Special Topics.** Prereq., graduate standing in comparative literature, theatre, classics, or instructor consent. Recommended prereq., ability to use literary texts in their original language. Same as MEMS 4030. Formerly MEDV 5030.

## Molecular, Cellular, and Developmental Biology

**MCDB 1030-3. Plagues, People, and Microorganisms.** Discusses the biology, history, ecology, and social impact of human plagues, including AIDS, smallpox, polio, bubonic plague, tuberculosis, leprosy, the impact of the Irish potato blight, and emerging human pathogens. The biology of pathogens and the human immune responses are treated in detail. Discusses the impact of molecular biology on curtailing the impact of diseases. For nonmajors. Approved for arts and sciences core curriculum: natural science.

**MCDB 1041-3. Fundamentals of Human Genetics.** Covers the basic principles of genetics, human pedigree analysis, and how genetic diseases affect DNA, RNA, and proteins. Considers implications of this research for medicine and society. For nonmajors. Recommended prereq., good background in high school chemistry and biology. Approved for arts and sciences core curriculum: natural science.

**MCDB 1111-4. Biofundamentals: The Evolutionary, Molecular, and Cellular Basis of Life.** A web-based, in-class discussion and online laboratory course covering the fundamental properties of biologic systems. Focused on common evolutionary, ecological, molecular and cellular mechanisms, the course provides a thorough introduction to the biological sciences. Credit not granted for this course and MCDB 1150 or 1151. Approved for arts and sciences core curriculum: natural science.

**MCDB 1150-3. Introduction to Cellular and Molecular Biology.** Covers biologically important macromolecules and biological processes, together with an introduction to cell structure, function, and physiology. Provides the foundation for advanced MCDB courses to majors, and a rigorous overview of modern biology to nonmajors. MCDB 1151 must be taken concurrently by MCDB and biochemistry majors and prehealth science students. Prereq., high school chemistry and algebra. Coreq., MCDB 1151 for majors. Credit not granted for this course and MCDB 1111. Meets MAPS requirement for natural sciences: lab. Approved for arts and science core curriculum: natural science.

**MCDB 1151-1. Introduction to Cell and Molecular Biology Lab.** Offers one two-hour lab per week designed to acquaint students with research techniques and concepts in molecular and cellular biology. Topics include cell structure, function, physiology, and recombinant DNA. MCDB 1150 must be taken concurrently. Credit not granted for this course and MCDB 1111. Meets MAPS requirement for natural sciences: lab. Approved for arts and sciences core curriculum: natural science.

**MCDB 1152-1. Problem Solving Co-Seminar for Introduction to Molecular and Cellular Biology.** Uses problem solving and other interactive group work to aid student learning in co-requisite course MCDB 1150. Students will work in small groups on learning and practicing how to solve difficult conceptual problems, as well as using hands-on activities and concept mapping to help learn content. Coreq., MCDB 1150.

**MCDB 1161-2. From Dirt to DNA: Phage Genomics Laboratory I.** Provides laboratory experience working on a bacteriophage genomics research project. Students will study novel bacteriophage they isolate from the environment. Topics covered include phage biology, bacteria and phage culturing and amplification, DNA isolation, restriction digest analysis, agarose gel electrophoresis, and electron microscopy. Coreq., MCDB 1150 or successful completion of 2 semesters of General Biology AP credit.

**MCDB 2150-3. Principles of Genetics.** Introduces the behavior of genes and chromosomes in eukaryotic and prokaryotic organisms. Covers three areas: transmission genetics, molecular genetics, and population genetics. Attention is given to genetic mapping, recombinant DNA procedures, and gene expression. MCDB 2151 must be taken by MCDB or biochemistry majors and prehealth science students concurrently or when next offered. Prereqs., MCDB 1150 or 1111 or EBIO 1210 or general biology. Approved for arts and sciences core curriculum: natural science.

**MCDB 2151-1. Principles of Genetics Laboratory.** One two-hour lab per week. Provides hands-on experience with principles introduced in MCDB 2150. Topics include mitosis, meiosis, classical genetics, complementation, mutagenesis, DNA replication, natural selection, and evolution. Prereqs., MCDB 1150 and 1151. Coreq., MCDB 2150. Approved for arts and sciences core curriculum: natural science.

**MCDB 2152-1. Problem Solving Co-Seminars for Genetics.** Uses problem solving and other interactive group work to aid student learning in co-requisite course MCDB 2150. Students will work in small groups on learning and practicing how to solve difficult conceptual problems, as well as using hands-on activities and concept mapping to help learn content. Coreq., MCDB 2150.

**MCDB 2840 (1-3). Lower-Division Independent Study.** May be repeated for credit, but only 8 hours of MCDB 2840 plus MCDB 4840 can be counted toward graduation. Students with adequate prerequisites should take MCDB 4840. Prereqs., instructor consent and independent study contract. Coreq., MCDB 1150.

**MCDB 3120-3. Cell Biology.** Introduces modern cell biology. Includes molecular basis of cellular organization and function, cellular membrane systems, intracellular organelles, mechanisms of energy transduction, the cytoskeleton, extracellular matrix, and functional organization of genetic material. Recommended for students planning careers in health sciences. MCDB 3140 must be taken concurrently or when next offered by MCDB and distributed studies majors. Prereq., MCDB 2150 or EBIO 2070. Coreq., CHEM 1131.

**MCDB 3140-2. Cell Biology Laboratory.** One four-hour lab per week. Provides experience with and exposure to modern cell biology laboratory techniques. Topics include microscopy, immunocytochemistry, Western blotting, Southern blotting, and flow cytometry. This course does not use vertebrate animals. Coreq., MCDB 3120.

**MCDB 3150-3. Biology of the Cancer Cell.** Highlights dimensions of the cancer problem; cancer as a genetic/cellular disease; chemicals, viruses, and radiation as causes of cancer; cancer and diet; cancer epidemiology; cancer risk factors; proto-oncogenes, oncogenes, and cancer suppressor genes; and prevention of cancer. Prereq., MCDB 2150 or EBIO 2070, or instructor consent. Approved for arts and sciences core curriculum: natural science.

**MCDB 3280-3. Molecular Cell Physiology.** Analyzes cellular mechanisms from a molecular perspective. Examines molecules as machines that are the basis of cellular mechanisms. Uses animal systems' physiology as examples. Prereqs., MCDB 3120 and CHEM 1133.

**MCDB 3330-3. Evolution and Creationism.** Intensive lecture/discussion course on the interrelationships among science, religion, and social policy. Includes historical and scientific development of evolution theory, social Darwinism/sociobiology, and the public perception of science. Prereq., MCDB 1111 or 1150 or instructor consent. Approved for arts and sciences core curriculum: natural science.

**MCDB 3350-3. Fertility, Sterility, and Early Mammalian Development.** Describes the production of germ cells, ovulation, fertilization, reproductive cycles, controls of reproduction, early development of the embryo, methods of contraception, and causes and treatments of sterility. Recommended for students planning careers in the health sciences. Prereq., MCDB 1150, EBIO 1210, or instructor consent.

**MCDB 3500-3. Molecular Biology.** Studies how molecular techniques are being used to characterize genes and their expression. Topics include mechanisms of DNA replication, mutation and repair, recombination, prokaryotic and eukaryotic gene expression, transposable genetic elements, current applications of recombinant DNA procedures, and identification of human genes. Prereqs., CHEM 1133, and either MCDB 2150 or EBIO 2070. Coreq., CHEM 3311 or 3351.

**MCDB 3650-3. The Brain—From Molecules to Behavior.** Examines the molecular basis of the brain's role in thought, action, and consciousness by exploring issues such as relationship of cognition and localized brain function, sensory systems and their role in cognition, learning and memory, and behavioral neurochemistry. Prereq., MCDB 1150 and 2150 or equivalent.

**MCDB 4110 (1-3). Special Topics.** Presentations of special topics in molecular, and/or cellular, and/or developmental biology, usually given by visiting faculty, alone or in conjunction with MCDB faculty. Prereq., instructor consent.

**MCDB 4111-3. Experimental Design and Research in Cell and Molecular Biology.** Learning molecular and cell biology experimental design and approaches through independent research projects. Students, working in pairs, will explore the research process and gain extensive first-hand experience in: hypothesis formation; experimental design; solution preparation and experimental methodology; proposal presentation and defense (oral and written); formal presentation of results and conclusions (oral and written in a publication-style format); the publication process; critical reading and evaluation of primary scientific literature. Prereq., MCDB 1150 or equivalent and instructor consent. Recommended coreq., MCDB 3500.

**MCDB 4130-3. Biological Electron Microscopy: Principles and Recent Advances.** Covers basic mechanisms for imaging and recent advances used in current biological research, elements of electron optics, image optimization, resolution, radiation damage, various imaging modes (TEM, HVEM, SEM, STEM, STM), specimen quantitation and reconstruction (stereo and 3-D), microanalysis, and electron diffraction. Specimen preparation treated only incidentally. Prereq., one of the following: MCDB 1150, EBIO 1220, MCDB 4500, PHYS 1120, or 2020, or instructor consent. Same as MCDB 5130 and PHYS 4130.

**MCDB 4201-3. From Bench to Bedside: The Role of Science in Medicine.** Demonstrates the breadth of research in the life sciences and how such research (not just in medical schools) can lead to medical applications. Lecturers from life sciences, the medical school and biotechnology, discuss drug development and the transfer of research into the clinical arena. Students also prepare a paper and presentation on the development of a commercial drug. Prereqs., MCDB 1150, 1151, or 1111, and MCDB 2150, 2151, 3120, and 3140.

**MCDB 4202-3. The Python Project.** Studies how python hearts grow after they consume a meal. Understanding the molecular processes of growth and regression in the python heart could lead to development of therapeutics for heart disease. Students work in groups in the laboratory and generate novel data by using modern molecular biology and bioinformatic techniques to clone and sequence candidate molecules of the python genome. May be repeated once. Prereqs., MCDB 1150 and 2150. Recommended prereqs., MCDB 3120, 3500, CHEM 4711 and 4731.

**MCDB 4300-3. Immunology.** Emphasizes cellular and molecular mechanisms by which organisms protect themselves from pathogens and the experimental basis for our understanding of these processes. Discusses development, function, and malfunction of t-cells, b-cells and other components of the immune system, focusing on the human immune system. Prereqs., MCDB 3120, 3500.

**MCDB 4310-3. Microbial Genetics and Physiology.** Examines the physiology and genetics of bacteria, Archaea and viruses. Particular emphasis will be on metabolism and cell division, adaptations to extreme environments, mechanisms of interactions with and manipulation of the environment, and evolution in response to environmental pressures. Prereqs., MCDB 2150 and

3500. Recommended prereqs. or coreqs., MCDB 3120, EBIO 3400, CHEM 4711, or instructor consent. Same as MCDB 5310.

**MCDB 4314-3. Algorithms for Molecular Biology.** Surveys combinatorial algorithms used to understand DNA, RNA, and proteins. Introduces students to methods used to process genomic data. Topics covered include a review of algorithms and molecular biology, sequence analysis, RNA and protein structure analysis, and comparative genomics. Students will get hands-on experience processing recent genomic data. Prereqs., CSCI 2270 and CSCI 3104, or CHEM 4711, or MCDB 3500 or IPHY 4200. Same as CSCI 4314 and MCDB 5314.

**MCDB 4330-3. Bacterial Disease Mechanisms.** Explores molecular and cellular interactions between bacteria and their eukaryotic hosts that precipitate disease. Activities include critical reading of review and research articles, preparation of homework assignments based on readings, and student presentations of assigned papers. Prereqs., MCDB 2150, 3120, and 3500. Same as MCDB 5330.

**MCDB 4350-3. Microbial Diversity and the Biosphere.** Provides a molecular phylogeny-based perspective on microbial diversity and the interactions between organisms that result in the biosphere. Provides overview of recent methods and findings in microbial ecology, as well as computer-based workshop in molecular phylogeny. Prereqs., CHEM 1133 or 1371, general biology, or instructor consent. Recommended prereqs., EBIO 3400 and/or CHEM 3311. Same as MCDB 5350.

**MCDB 4361-3. Evolution and Development.** Relates how recent discoveries in the molecular mechanisms of development are shaping our understanding of animal evolution. The course will review basic principles of molecular developmental biology and apply these concepts to critically discuss current research in the field of Evo-Devo (evolution and development). Prereqs., MCDB 3120 and MCDB 3500. Same as MCDB 5361.

**MCDB 4410-3. Human Molecular Genetics.** Studies the human organism as a genetic system, including effect of mutation on protein structure and function, biochemical basis of human genetic disease, polymorphic gene loci, gene mapping and identification, gene cloning and characterization, and impact of human genetics on medicine and society. Prereq., MCDB 3500.

**MCDB 4425-3. Cellular Stress Responses: Molecular Mechanisms, Physiology, and Human Diseases.** In this critical thinking course, students will apply their knowledge of basic biology to exploring several of the most exciting topics in biomedicine including protein folding and stress responses, nutrient sensing and balance, and signal transduction across membranes. Emphasis will be placed upon human physiology and associated human diseases including Alzheimer's disease, diabetes, and cardiovascular disease. Prereq., MCDB 3120 or 3500 or instructor consent.

**MCDB 4426-3. Cell Signaling and Developmental Regulation.** Introduces several cell signaling processes and their biological functions. Students read and analyze original research articles to learn the thinking processes of scientific research. Writing assignments and oral presentations are required. Prereqs., MCDB 3120, 3500, and CHEM 4711, or instructor consent. Same as MCDB 5426.

**MCDB 4444-3. Cellular Basis of Disease.** Explores the cellular basis of disease. Discusses diseases arising from defects in intracellular targeting, cytoskeletal function, intracellular signaling, genomic instability, gene regulation, cell proliferation, and cell death. Involves student-organized presentations and classroom discussion. Prereq., MCDB 2150, 3120, and 3500.

**MCDB 4471-3. Mechanisms of Gene Regulation in Eukaryotes.** Focuses on manifestations of regulated gene expression. Studies gene regulation at multiple steps, including transcription, RNA processing, and translation. Is based on critical analysis of primary research papers. Written assignments and oral presentations are required. Prereq., MCDB 3500 or instructor consent. Same as MCDB 5471. Credit not granted for this course and MCDB 4470/5470.

**MCDB 4501-3. Structural Methods for Biological Macromolecules.** This course teaches fundamental knowledge about protein structures, protein interactions and protein folding. It will discuss in detail the most common methods on how proteins and macromolecular complexes are studied, such as X-ray crystallography, NMR-spectroscopy, and electron microscopy. The course will offer about 50 percent direct teaching, 40 percent discussion of

papers in a journal club style, and 10 percent hands-on practicals on software packages relevant to structural biology. Prereqs., MCDB 3120 and 3500.

**MCDB 4520-3. Bioinformatics and Genomics.** Computational and experimental methods in bioinformatics and genomics, and how these methods provide insights into protein structure and function, molecular evolution, biological diversity, cell biology, and human disease. Topics include database searching, multiple sequence alignment, molecular phylogeny, microarrays, proteomics, and pharmacogenomics. Prereqs., CHEM 4711, and CHEM 4731 or MCDB 3500. Same as MCDB 5520.

**MCDB 4550-3. Cellular and Molecular Motion, A Biophysical Approach.** Focuses on the biophysics governing enzyme mechanisms, cellular mechanisms, cellular structure and motion. Synthesizes ideas from molecular biology, physics, and biochemistry, emphasizing how low Reynolds number physics, not Newtonian physics, is relevant to life inside of a cell. Prereq., CHEM 1133 or 1371, PHYS 2010, 2020, MCDB 3120, or instructor consent. Recommended prereqs., MATH 1300 and/or CHEM 3311. Same as MCDB 5550.

**MCDB 4600-3. Molecular Approaches to Human Diseases.** Studies basic research using molecular biology and its contribution to treatment of human diseases. Includes an overview of physiology, clinical presentation, basic research, and detailed analyses of molecular approaches taken to understand and treat human diseases. Prereqs., MCDB 2150, 3120, and 3500. Recommended prereq., MCDB 4620.

**MCDB 4615-3. Biology of Stem Cells.** Stem cells have received considerable notice in both the scientific and social arena. The course will examine the stem cell concept by a critical examination of the primary scientific literature. Topics will include pluripotency and plasticity, environment, technology, self-renewal, transdifferentiation, molecular signature, epigenetic programming and stem cell versus cancer cell. Prereqs., MCDB 2150, 3120, 3500, or instructor consent. Same as MCDB 5615.

**MCDB 4621-3. Genome Databases: Mining and Management.** Develops essential skills for performing genomic analyses, with focus on developing practical research tools. Introduces human genome and microbiome projects, Python/SQL scripting, accessing and understanding genomic data, sequence alignment and search, evolutionary models, expression data, biological networks, and macromolecular structure. Prereqs., MCDB 3500, CSCI 3104 or CHEM 4711; coreq., CSCI 2270. Same as MCDB 5621. Credit not granted for this course and CHEM 4621 or CSCI 4317.

**MCDB 4650-3. Developmental Biology.** Analyzes development, emphasizing cellular, molecular, and genetic mechanisms. Topics include descriptive embryology, developmental control of gene expression in eukaryotic cells, mechanisms of differentiation and morphogenesis, and developmental genetics. Prereq., MCDB 3120 and 3500, or instructor consent. The related lab course, MCDB 4660, can be taken concurrently. Credit not granted for this course and MCDB 4620, EPOB 3650, or EPOB 4600.

**MCDB 4660-2. Developmental Biology Laboratory.** Provides an opportunity for guided research on *Caenorhabditis elegans* and *Xenopus*. Experiments will focus on descriptive and experimental embryology, developmental genetics, and application of cell and molecular biology methods applied to developing organisms. This course uses living vertebrate animals and/or tissues. Prereq. or coreq., MCDB 4650. Credit not granted for this course and MCDB 4630 or EPOB 4600.

**MCDB 4680-3. Mechanisms of Aging.** Studies aging as a developmental process emphasizing genetic, cellular, and molecular mechanisms. Prereqs., MCDB 3120 and 3500. Same as MCDB 5680.

**MCDB 4750-3. Animal Virology.** Encompasses the structure and replication of both lytic and transforming animal viruses. Emphasizes diversity of naturally occurring genomic structures and the resulting strategies of infection as well as the impact of viral epidemics on society. Includes critical analysis of primary research papers. Prereq., MCDB 3500 or instructor consent.

**MCDB 4777-3. Molecular Neurobiology.** Introduces the functional anatomy of the nervous system, and explores current knowledge regarding the molecular and genetic basis of the development and function of the nervous system. Studies recent insights into the molecular basis of neurodegenerative diseases, in the last portion of the course. Prereqs., MCDB 3120 and 3500, or equivalent.

**MCDB 4790-3. Experimental Embryology.** Embryology is studied by considering experiments relevant to specific topics of early animal development. Emphasizes reading, interpretation, and discussion of research articles. Prereqs., MCDB 3120, and EPOB 3650 or MCDB 3500.

**MCDB 4810-3. Insane in the Membrane: The Biology and Biophysics of the Membrane.** Studies the biology and physics of the biomembrane. Topics include structure and mechanism of membrane proteins; membrane biogenesis; membrane protein folding and stability; membrane homeostasis; mechanisms of membrane fusion and fission; lipid trafficking. Prereq., CHEM 4711 or instructor consent. Same as MCDB 5810.

**MCDB 4811 (3-4). Teaching and Learning Biology.** Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its valuation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions. Prereqs., MCDB 1111 or 1150, 2150 and 3120. Same as MCDB 5811 and EDUC 6811.

**MCDB 4840 (1-6). Upper-Division Independent Study.** May be repeated for credit, but only 8 hours of MCDB 2840 plus MCDB 4840 can be counted toward graduation. Prereqs., MCDB 2150, instructor consent, and independent study contract.

**MCDB 4970-3. Seminar on Physical Methods in Biology.** Covers basic mechanisms and applications of physical methods used in current biological research, microprobe analysis, EELS, elementary electron and x-ray crystallography, biomedical imaging (NMR, MRI, PET, CAT), Fourier analysis, synchrotron radiation, EXAFS, neutron scattering, and novel ultramicroscopy techniques. Includes lectures, student presentations, occasional demonstrations. Emphasis depends on student interest. Prereqs., MCDB 1050 or 3120, and/or PHYS 1120 and 1140, or 3010 and 3020, or instructor consent. Same as MCDB 5970 and PHYS 4970.

**MCDB 4980-3. Honors Research.** Provides faculty-supervised research for students who have been approved by the departmental honors committee. Normally taken during the semester before completion of the honors thesis. Prereqs., MCDB 4840 or comparable research experience, and a GPA of 3.20 or better.

**MCDB 4990-3. Honors Thesis.** Involves the preparation and defense of an honors thesis, based on faculty-supervised original research, including final phases of the research project. Prereqs., MCDB 4840, 4980, or comparable research experience, a GPA of 3.30 or better, and approval by the MCDB honors committee.

**MCDB 5130-3. Biological Electron Microscopy: Principles and Recent Advances.** Same as MCDB 4130 and PHYS 5130.

**MCDB 5210-3. Cell Structure and Function (Lecture and Discussion).** Instructor consent required.

**MCDB 5220-3. Molecular Genetics (Methods and Logic).** Instructor consent required.

**MCDB 5230-3. Gene Expression (Lecture and Discussion).** Instructor consent required.

**MCDB 5250-3. Topics in Developmental Genetics (Methods and Logic).** Instructor consent required.

**MCDB 5310-3. Microbial Genetics and Physiology.** Same as MCDB 4310.

**MCDB 5314-3. Algorithms for Molecular Biology.** Same as MCDB 4314 and CSCI 5314.

**MCDB 5330-3. Bacterial Disease Mechanisms.** Same as MCDB 4330.

**MCDB 5350-3. Microbial Diversity and the Biosphere.** Same as MCDB 4350.

**MCDB 5361-3. Evolution and Development.** Same as MCDB 4361.

**MCDB 5426-3. Cell Signaling and Developmental Regulation.** Same as MCDB 4426.

**MCDB 5471-3. Mechanisms of Gene Regulation in Eukaryotes.** Same as MCDB 4471.

**MCDB 5520-3. Bioinformatics and Genomics.** Same as MCDB 4520.

**MCDB 5550-3. Cellular and Molecular Motion, A Biophysical Approach.**

Same as MCDB4550.

**MCDB 5615-3. Biology of Stem Cells.** Same as MCDB 4615.**MCDB 5621-3. Genome Databases: Mining and Management.** Same as MCDB 4621. Credit not granted for this course and CSCI 5317 or CHEM 5621.

**MCDB 5650-1. Teaching and Learning in Undergraduate Science Courses.** Discusses recent research on how students learn and applications to the teaching of undergraduate science courses. Conducted as an interactive workshop, in which active-engagement in learning approaches are modeled and experienced by participants. Open to undergraduate and graduate students. May be used to fulfill the pedagogical training requirement for undergraduate Learning Assistants in upper division science courses. Post-doctoral and faculty auditors are welcome to participate as regular auditors.

**MCDB 5680-3. Mechanisms of Aging.** Same as MCDB 4680.

**MCDB 5776-1. Scientific Ethics.** Prereq., CHEM 5771 or MCDB 5230 taken concurrently and instructor consent. Same as CHEM 5776.

**MCDB 5777-3. Molecular Neurobiology.** Same as MCDB 4777.**MCDB 5810-3. Insane in the Membrane: The Biology and Biophysics of the Membrane.** Same as MCDB 4810.

**MCDB 5811 (3-4). Teaching and Learning Biology.** Same as MCDB 4811 and EDUC 6811.

**MCDB 5970-3. Seminar on Physical Methods in Biology.** Same as MCDB 4970 and PHYS 5970.

**MCDB 6000-3. Introduction to Laboratory Methods.** Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to plan and execute experiments in selected areas. Open only to MCDB graduate students. May be repeated up to 9 total credit hours.

**MCDB 6336-1. Transcription and RNA Processing.** Study of recent publications in transcription and RNA processing fields. Students present and discuss recent publications. Goals are that the student will improve critical analysis of data and will learn techniques relevant to the field. Students will keep up-to-date with current literature, will lead discussions of topic of interest, and will learn good presentation skills. Prereq., MCDB 5210, 5230 or instructor consent.

**MCDB 6337-1. Cell Cycle Research.** Cell cycle regulation is a major biological issue relevant to a number of disease states, including cancer. Surveys the current literature in the cell cycle field. Students present current publications; class participation in discussion is expected. Prereqs., MCDB 5210 and 5230.

**MCDB 6338-1. Current Topics in Developmental Genetics and Signal Transduction.** Students present and discuss current research papers in the areas of developmental biology and cell signaling. Goals are to improve skills in critical evaluation and presentation of research results as well as to keep up with current literature. Students must present and lead discussions of at least one paper; all students are expected to read papers in advance. Prereq., instructor consent.

**MCDB 6339-1. Microbiology Supergroup.** Present and receive feedback on your in-progress microbiology research. Learn about and discuss research at CU that is microbiological but outside of your specialty. Participate in journal clubs on microbial physiology. May be repeated up to 3 total credit hours.

**MCDB 6440 (1-3). Special Topics in MCD Biology.** Acquaints students with various topics not normally covered in the curriculum. Offered intermittently or upon student demand, and often presented by visiting professors. May be repeated up to 4 total credit hours.

**MCDB 6621-1. Special Topics in RNA.** Reviews and evaluates recent scientific literature in the field of RNA chemistry and biology, including topics in structure, catalysis, bioinformatic approaches, and control of gene expression. Primarily for graduate level presentation of special topics by students and research staff. May be repeated up to 5 total credit hours. Prereq., graduate standing or instructor consent. Same as CHEM 6621.

**MCDB 6940-3. Master's Degree Candidate.**

**MCDB 6950 (1-6). Master's Thesis.** Students seeking a master's degree should consult a departmental advisor. Plan I or Plan II is offered.

**MCDB 7790 (1-3). Graduate Seminar.**

**MCDB 7840 (1-6). Graduate Independent Study.** Instructor consent and independent study contract required. May be repeated up to 7 total credit hours.

**MCDB 7910-1. Seminar Practicum.** Designed for graduate students to give oral presentations on their thesis research, field questions, respond to critiques, and present background information. May be repeated up to 3 total credit hours.

**MCDB 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Museum and Field Studies

### Independent Study

**MUSM 4900 (1-6). Independent Study.** May be repeated up to 6 total credit hours. Same as MUSM 5900.

**MUSM 5900 (1-6). Graduate Independent Study.** Same as MUSM 4900.

### Museum Studies

**MUSM 4010-3. Museums and Society.** Investigates the museum as an institution in society; history of museums and changing roles and methods in society; administrative structure; museum profession; methodology of museum collections, exhibitions, and education. Designed for students interested in museums or museum careers.

**MUSM 4494-3. Field Research: Basic Methods and New Technologies.** Students are exposed to a wide variety of field methods in disciplines specific to natural history museums, with field exercises in zoology, archaeology, paleontology, geology, botany, and entomology. Emphasizes the collection and analysis of spatial and geographic data. Prereq., instructor consent. Same as MUSM 5494.

**MUSM 5011-4. Introduction to Museum Studies.** Provides background in history and literature of museums, their objectives and methods, laboratory exercises in curatorship, exhibition theory, and administration. Prereq., instructor consent.

**MUSM 5021 (2-3). Selected Museum Topics.**

**MUSM 5030-3. Museum Education.** Surveys and discusses the educational role of museums and informal learning centers. Issues include current trends, learning theories and styles, learning from objects, education programs, diverse audiences, museum/school partnerships, and the role of education in exhibit development.

**MUSM 5031-3. Museums and the Public: Exhibit Development.** Covers elements of exhibition development and design, up to production and evaluation of exhibit prototypes. The team approach is emphasized. Prereqs., graduate standing and instructor consent.

**MUSM 5041-3. Museum Administration.** Covers theory of organizations and how it applies to museums, application of small business management and non-profit organizations to museums, marketing and development, and grant writing and funding strategies. Prereq., graduate standing or instructor consent.

**MUSM 5051-3. Museum Collections Management.** Deals specifically with curation and data management. Topics include acquisition practices and problems; organization, management, use and preventive conservation of collections; and computer data management of collections. Prereq., instructor consent.

**MUSM 5061-3. Introduction to Scientific Illustration.** Intended for students with little to no art background. Focus is on the accurate rendering of scientific subjects for publication and for public display. Course begins with basic drawing skills and sharpening of visual perception. Students progress to be able to produce realistic renderings of subjects. Students are exposed to a variety of black and white and color techniques and the standards for

presenting illustrations for a variety of audiences. Course concludes with computer illustration tools and techniques.

**MUSM 5494-3. Field Research: Basic Methods and New Technologies.** Same as MUSM 4494.

**MUSM 6110 (1-3). Seminar in Museum Issues.** Offers a weekly seminar for museum and field study students that addresses one new topic each semester relevant to museum operations such as archival administration, museums, multiculturalism, repatriation, and others. Prereqs., MUSM 5011, graduate standing, and instructor consent.

**MUSM 6140 (1-3). Advanced Topics and Trends.** Discusses current topics and/or trends in the museum profession. Topics change annually to reflect current topics and trends and the most current museum issues. Prereq., graduate standing and instructor consent. Recommended prereq., MUSM 5011 and 5051.

**MUSM 6150-3. Critical and Theoretical Issues in Museums.** Investigates key problems facing museum institutions and studies the staging and representation of historical knowledge, the ethics of collecting and display, the changing nature and uses of historical evidence, and relations between curatorial practice, collecting, and field work. Critically examines different approaches to museums and museology in various disciplines, both past and present. Prereq., MUSM 5011 or instructor consent. Same as ARTH 6150, HIST 6150, and ANTH 6150.

**MUSM 6930 (2-4). Museum Internship.** Provides experience in museums of different sizes, audiences, and subjects, including history, natural history, art, and children's museums. Each student is supervised individually by a faculty member as well as the appropriate person in the cooperating museum. Prereq., instructor consent.

**MUSM 6940 (1-3). Master's Degree Candidate.**

**MUSM 6950 (1-6). Master's Thesis in Museum and Field Studies.** A thesis, which may be of a research, expository, critical or creative type, is required of every master's degree candidate under the thesis option. Prereqs., MUSM 5011 and 5051, and one of the following: MUSM 5030, 5031, or 5041.

**MUSM 6960 (1-4). Master's Project or Paper in Museum and Field Studies.** A project or paper in the student's discipline and related to some aspect of museum studies is required of every master's degree candidate under the non-thesis-option plan. Prereqs., MUSM 5011 and 5051. Students in collections/field track also need MUSM 5030, 5031, OR 5041.

## Anthropology

**MUSM 4462 (2-6). Museum Field Methods in Anthropology.** Archaeological field techniques including excavation, mapping, recording, photography, interpretation, and field laboratory. May be repeated up to 6 total credit hours. Same as MUSM 5462.

**MUSM 4912-3. Museum Practicum in Anthropology.** Students take part in curatorial procedures of the anthropology section of the museum: conservation, cataloguing, collection management, and administration. Prereq., MUSM 5011 or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5912.

**MUSM 5912-3. Museum Practicum in Anthropology.** Same as MUSM 4912.

## Botany

**MUSM 4473-3. Museum Field Methods in Botany.** Emphasizes field techniques for observation, analysis, and identification of vascular plants, collection, preservation, and date recording for museum specimens. Prereq., instructor consent.

**MUSM 4913-3. Museum Practicum in Botany.** Students take part in curatorial procedures of the botany section of the museum: specimen preparation, labeling, identification, cataloguing, conservation, and collection management. Prereq., MUSM 5011 or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5913.

**MUSM 5913-3. Museum Practicum in Botany.** Same as MUSM 4913.

## Geology

**MUSM 4914-3. Museum Practicum in Geology.** Students take part in curatorial procedures of the geology section of the museum: field collection, specimen preparation, cataloguing, collection management, and a survey of current laws as they apply to specimens. Prereq., MUSM 5011 or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5914.

**MUSM 5474-4. Vertebrate Paleontology.** Discusses the history and evolution of the vertebrates, including the phylogenetic relationships and evolutionary patterns of the major groups. Lab focuses on comparative vertebrate osteology and fossil representation of major groups. Same as GEOL 5474.

**MUSM 5914-3. Museum Practicum in Geology.** Same as MUSM 4914.

## Zoology

**MUSM 4795-3. Field Methods/Zoology and Botany.** Class covers research and field methods for biological disciplines associated with natural history museums: vertebrates, invertebrates, and plants. Emphasis is on field research techniques: observations, sampling, collection and preservation methods, and comparisons among elevation zones. Includes 5 field labs, 2 weekend trips, 5 lab practica, experience with several taxonomic experts, and individual research projects. Same as MUSM 5795, ENV5 4795, and EBIO 4795.

**MUSM 4915 (1-3). Museum Practicum in Zoology.** Students take part in basic curatorial procedures of the zoology section of the museum: relaxing, fixing, positioning, preserving, cataloguing, storing, and shipping. Also introduces students to the animal kingdom. Prereq., instructor consent. Same as MUSM 5915.

**MUSM 5795-3. Field Methods/Zoology and Botany.** Same as MUSM 4795 and EBIO 5795.

**MUSM 5915 (1-3). Museum Practicum in Zoology.** Same as MUSM 4915.

## Entomology

**MUSM 4916 (1-3). Museum Practicum in Entomology.** Students take part in curatorial procedures of the entomology section of the museum: field collection, specimen preparation, labeling, identification, rearing techniques, and exhibit preparation. Prereq., 5011, or equivalent. Enrollment is limited; students should make arrangements during previous semester. Same as MUSM 5916.

**MUSM 5916 (1-3). Museum Practicum in Entomology.** Same as MUSM 4916.

## Museology

**MUSM 4917 (1-3). Museum Practicum in Techniques.** Students participate in museum public education functions that may include researching, planning, developing, and producing exhibits, traveling trunks, booklets, and other materials. May involve writing labels, molding and casting, conservation, and restoration. May be repeated up to 6 total credit hours. Same as MUSM 5917.

**MUSM 5917 (1-3). Museum Practicum in Techniques.** Same as MUSM 4917.

## Music

*The following courses offered in the College of Music are accepted for arts and sciences core curriculum credit.*

**MUEL 1832-3. Appreciation of Music.** Provides a basic knowledge of primarily Western music literature and development of discriminating listening habits. Restricted to nonmusic majors. Formerly EMUS 1832. Approved for arts and sciences core curriculum: literature and the arts. Offered fall and spring.

**MUEL 2752-3. Music in American Culture.** Offers a stylistic and historical examination of trends that have influenced present-day music in the U.S. Formerly EMUS 2752. Approved for arts and sciences core curriculum: United States context. Offered fall and spring.

**MUEL 2772-3. World Musics.** Highlights music outside Western art tradition, using current ethnomusicological materials. Spring semester focuses on musical cultures of the Americas, Africa, and Europe; fall semester focuses on musical cultures of Asia and Oceania. May be repeated up to 6 total credit

hours. Formerly EMUS 2772. Approved for arts and sciences core curriculum: human diversity.

**MUEL 2852-3. Music of the Rock Era.** Examines popular music, concentrating on the U.S. after 1950. Considers precursor styles (e.g., blues folk) and contributions to the new rock style; discusses the evolution of rock style from 1960 through the 1990s. Formerly EMUS 2852. Approved for the arts and sciences core curriculum: literature and the arts. Offered spring only.

**MUEL 2862-3. American Film Musical, 1926–1954.** Examines the development of filmed musicals from the beginning of sound movies through the Golden Age of Musicals. Emphasizes analysis and relationships of characters, songs, and incidental music. Formerly EMUS 2862. Approved for arts and sciences core curriculum: literature and the arts.

**MUEL 3822-3. Words and Music.** Explores the interaction between words and music in song. Students will consider how such features as rhyme, rhythm, tone, and the connotations of particular words contribute to meaning in poetry; how rhythm, tempo, dynamics, mood, and instrumentation contribute to meaning in music; and how words and music coalesce in song to make a new meaning. Restricted to nonmusic majors. Formerly EMUS 3822. Approved for arts and sciences core curriculum: literature and the arts.

**MUEL 3832-3. Music in Literature.** Addresses literature that seeks either to explore the meaning of music or to make music out of words. Students will consider how musical concepts and techniques can be incorporated into poetry and prose, and will analyze the roles that writers have attributed to music in society, politics, and the life of the individual. Restricted to nonmusic majors. Formerly EMUS 3832. Approved for arts and sciences core curriculum: literature and the arts.

## Neuroscience

**NRSC 5100 (2-5). Introduction to Neuroscience I.** Provides an intensive introduction to the principles of neuroscience, initially covering the detailed neuroanatomy of human forebrain, hindbrain, and spinal cord. This is followed by neurophysiology with a concentration on the electrophysiology of neural systems. The basics of neuroanatomy and neurophysiology with a concentration on the electrophysiology are then applied to an examination of the structure and function of visual, auditory, and sensorimotor systems in animal and man.

**NRSC 5110-3. Introduction to Neuroscience II.** Provides an intensive interdisciplinary introduction to the principles of neuroscience. It is a sequel to NRSC 5100. Provides a detailed overview of neurochemistry, neurodevelopment, neuromotor control, neurogenetics, and cognitive neuroscience. Prereq., NRSC 5100.

**NRSC 6100-2. Advances in Neuroscience Seminar.** Designed for beginning graduate students interested in neuroscience. Students read, discuss, and evaluate the primary literature on a number of current topics in neuroscience as well as attend the seminar program in neuroscience. May be repeated up to 8 total credit hours.

## Peace and Conflict Studies

**PACS 2500-3. Introduction to Peace and Conflict Studies.** Introduces the field of peace and conflict studies. Examines causes and dynamics of conflict and violence (interpersonal to global), peace institutions and research, peace movements, nonviolence, and careers in conflict resolution and peacemaking.

**PACS 3800-3. Topics in Peace and Conflict Studies.** Content varies depending on instructor. May provide an overview of the field; cover scientific, philosophical, or historical approaches; or analyze a specific substantive topic.

**PACS 4500-3. Senior Seminar in Peace and Conflict Studies.** Examines specific theoretical perspectives in peace and conflict studies and conducts in-depth research projects using a case-study approach. Emphasizes using critical thinking skills in writing and class discussion. Case study examples include: U.S. violence, peacemaking/keeping in ethnonationalist conflicts, environmental conflict resolution. Prereq., PACS 2500 or instructor consent.

## Philosophy

*All courses at the 3000 level require at least 6 hours of philosophy and sophomore standing, unless otherwise indicated. All courses at the 4000 level require at least 12 hours of philosophy and junior standing, unless otherwise indicated.*

**PHIL 1000-3. Introduction to Philosophy.** Introduces fundamental topics of philosophy, e.g., knowledge, truth, universals, self, the mind-body problem, time, God, and value. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 1010-3. Introduction to Western Philosophy: Ancient.** Develops three related themes: the emergence in antiquity of a peculiarly scientific mode of thinking; the place of religious belief within this developing scientific world view; and the force of ethical speculation within the culture and political climates of ancient Greece and Rome. PHIL 1010 and 1020 may be taken in either order. Same as CLAS 1030. Approved for arts and sciences core curriculum: historical context.

**PHIL 1020-3. Introduction to Western Philosophy: Modern.** Introduces several philosophical texts and doctrines of 17th and 18th century Europe. Gives special attention to the connection between philosophical ideas and the wider historical milieu—social, political, and literary. PHIL 1010 and 1020 may be taken in either order. Approved for arts and sciences core curriculum: historical context.

**PHIL 1100-3. Ethics.** Introductory study of major philosophies on the nature of the good for humanity, principles of evaluation, and moral choice as they apply to contemporary moral problems. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 1200-3. Philosophy and Society.** Introduces philosophical thought through critical analysis of our own society, its institutions, and principles. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: United States context or ideals and values.

**PHIL 1400-3. Philosophy and the Sciences.** Considers philosophical topics and concepts related to the natural sciences, such as science and pseudoscience; scientific method; the nature of explanation, theory, confirmation, and falsification; the effect of science on basic concepts like mind, freedom, time, and causality; ethics of experimentation; and the relation of science to society. Approved for arts and sciences core curriculum: natural science.

**PHIL 1440-3. Introductory Logic.** Introductory study of definition, informal fallacies, and the principles and standards of correct reasoning. Provides practice in analyzing, evaluating, and constructing frequently encountered types of arguments. Does not fulfill major requirement in logic.

**PHIL 1600-3. Philosophy and Religion.** Philosophical introduction to some of the central concepts and beliefs of religious traditions, focusing particularly on the question of the existence of God and on the relation between religious beliefs and moral beliefs. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 1700-3. Philosophy and the Arts.** Considers philosophic questions involved in the analysis and assessment of artistic experiences and of the objects with which the arts, including the literary arts, are concerned.

**PHIL 1750-3. Philosophy through Literature.** Introduces philosophy through literature. Selected novels, plays, and short stories that exemplify traditional problems in philosophy are read and discussed.

**PHIL 1800-3. Open Topics/Philosophy.** May be repeated up to 6 total credit hours.

**PHIL 2140-3. Environmental Justice.** Traditional and contemporary theories of justice are employed in order to critically analyze social and political issues that have important environmental dimensions. Assesses the relationship of justice and equity to the presuppositions of national and global environmental issues and policies.

**PHIL 2200-3. Major Social Theories.** Introductory study of major philosophies of the past in relation to political, economic, and social issues. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 2220-3. Philosophy and Law.** Considers philosophical issues related to law in general and the U.S. system in particular. Topics to be covered may

address such questions as the following: What is the nature of law? What kinds of acts should the law prohibit (e.g., abortion, drug use, pornography, cloning)? Is there a moral obligation to obey the law? Can civil disobedience be justified? Is there a justification for punishing people for breaking the law? Is capital punishment, in particular, morally justified? Approved for arts and sciences core curriculum: United States context.

**PHIL 2270-3. Philosophy and Race.** Explores the historical relationship between western philosophy and race and investigates the ways in which philosophy can be used to address contemporary racial issues. Approved for arts and sciences core curriculum: human diversity.

**PHIL 2290-3. Philosophy and Women.** Explores different approaches to the study of women. Same as WMST 2290. Approved for arts and sciences core curriculum: human diversity.

**PHIL 2390-3. Philosophy and Psychology.** Interdisciplinary course on issues where philosophy and psychology meet; for example, topics such as selfhood, motivation, psychotherapy, freedom, and human behavior are examined. Selected readings in philosophy and psychology are required.

**PHIL 2440-3. Symbolic Logic.** First course in mathematical logic. Topics include sentential logic, the logic of quantification, and some of the basic concepts and results of metalogic (interpretations, validity, and soundness).

**PHIL 2610-3. From Paganism to Christianity.** Offers a cultural history of Greek and Roman religion. Students read ancient text in translation and use evidence from archaeology to reconstruct the shift from paganism to Christianity in antiquity. Same as CLAS 2610. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 2750-3. Philosophy and Science Fiction.** Explores philosophical issues in science fiction literature and film. Topics may include time travel, artificial intelligence, free will, personal identity, and how scientific advances will change human life and society. Students may read science fiction stories and philosophical articles, and watch several movies.

**PHIL 2800-3. Open Topics/Philosophy.** May be repeated up to 6 total credit hours.

**PHIL 2840 (1-3). Independent Study.** May be repeated up to 8 total credit hours. Prereq., sophomore standing.

**PHIL 3000-3. History of Ancient Philosophy.** A survey of selected figures in ancient Greek and Roman philosophy and in medieval philosophy. Philosophers studied may include the pre-Socratics, Plato, Aristotle, the Hellenistic philosophers, and such figures as Aquinas and Occam. Explores the larger cultural contexts that influenced these philosophers and were, in turn, influenced by them. Prereqs., 6 hours of philosophy coursework. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: historical context.

**PHIL 3010-3. History of Modern Philosophy.** Introduces modern philosophy, focusing on the period from Descartes through Kant. In addition to careful analysis of philosophical arguments, attention is paid to the ways in which philosophers responded to and participated in major developments in the 17th and 18th century, such as the scientific revolution. Prereq., 6 hours of philosophy course work. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: historical context.

**PHIL 3100-3. Ethical Theory.** Studies major issues and theories in ethics. Prereq., 6 hours of philosophy course work. Prereq. or coreq., PHIL 3480. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3110-3. Feminist Practical Ethics.** Explores a variety of personal and public policy issues in the light of the basic feminist commitment to opposing women's subordination. Provides a sense of how a principled commitment to feminism may influence or be influenced by prevailing interpretation of contemporary ideals and values, and gives an opportunity for developing skills of critical analysis. Prereq., WMST 2000 or 2290. Restricted to juniors/seniors. Same as WMST 3110. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3140-3. Environmental Ethics.** Examines major traditions in moral philosophy to see what light they shed on value issues in environmental policy and the value presuppositions of the economic, ecological, and juridical

approaches to the environment. Prereq., sophomore standing or PHIL 1100, 1200, 2200, 3100, or 3200. Same as ENVS 3140. Approved for Arts and Sciences core curriculum: ideals and values.

**PHIL 3160-3. Bioethics.** Analysis of ethical problems involved in such issues as abortion, euthanasia, organ transplants, eugenics, treatment of the patient as a person, and the institutional nature of the health care delivery system. Prereq., 6 hours of philosophy course work. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3180-3. Critical Thinking: Contemporary Topics.** Looks at a selected topic such as nuclear disarmament, racial and sexual discrimination, animal rights, or abortion and euthanasia by examining issues through the lens of critical philosophical analysis. Reviews the reasoning behind espoused positions and the logical connections and argument forms they contain. Prereq., 6 hours of philosophy course work. Restricted to sophomores/juniors/seniors.

**PHIL 3190 (3-4). War and Morality.** Focuses on moral issues raised by war as a human institution. What are the justifications, limits, and alternatives? Does the advent of nuclear weapons change the nature of war? Prereq., 6 hours of philosophy course work. Restricted to sophomores, juniors and seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3200-3. Social and Political Philosophy.** Systematic discussion and analysis of such philosophic ideas as community, freedom, political power, and violence. Prereq., 6 hours of philosophy course work. Restricted to sophomores, juniors and seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3260-3. Philosophy and the International Order.** Considers philosophical topics concerning the international economic, political, and legal systems. Topics that may be considered include the nature of international law, war and peace, humanitarian intervention, international justice, world hunger, and human rights. Prereq., 6 hours PHIL course work. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3310-3. Cognitive Science.** An interdisciplinary introduction to cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Prereq., two of the following four courses: PSYC 2145, LING 2000, CSCI 1300, PHIL 2440. Same as PSYC/LING 3005 and CSCI 3702.

**PHIL 3340-3. Epistemology.** Studies some of the main topics of theory of knowledge, such as evidence, justification, prediction, explanation, skepticism, and concept acquisition. Prereq., 12 credit hours of philosophy, including PHIL 2440 and 3010. Recommended prereq., PHIL 3480. Restricted to junior/senior majors.

**PHIL 3410-3. History of Science: Ancients to Newton.** Surveys the history of science up to Newton, including the emergence of scientific modes of thinking from religious and philosophical roots in the Near East and Greece to the development of these modes in the Middle Ages and Renaissance. Culminates with Isaac Newton and the 17th century scientific revolution. Prereq., 6 hours of philosophy course work. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: historical context or natural science.

**PHIL 3430-3. History of Science: Newton to Einstein.** The history of physical and biological science, from the epoch-making achievements of Charles Darwin in biology to the dawn of the 20th century revolutions in physics, chemistry, and genetics. Deals with the success of the mechanical philosophy of nature and its problems. Prereq., 6 hours of philosophy course work. Restricted to sophomores/juniors/seniors. Approved for arts and sciences core curriculum: historical context or natural science.

**PHIL 3480-3. Critical Thinking/Writing in Philosophy.** Focuses upon the fundamental skills, methods, concepts, and distinctions that are essential for the study of philosophy. The basic skills covered include the writing of philosophy papers, the reading of articles, and the extraction and evaluation of arguments. Prereq., 6 hours of philosophy course work. Prereq. or coreq., PHIL 2440. Restricted to sophomore/junior/senior PHIL majors. Approved for art and sciences core curriculum: written communication.

**PHIL 3600-3. Philosophy of Religion.** Philosophical discussion of fundamental issues in religion, such as existence of God, religious experience, faith and reason, evil, immortality, and religious language. Prereq., 6 hours of philoso-



phy course work. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: ideals and values.

**PHIL 3700-3. Aesthetic Theory.** Introduces major theories of aesthetics and contemporary discussions of problems, e.g., the nature of art and the problem of evaluations in art. Prereq., 6 hours of philosophy course work. Restricted to sophomores, juniors and seniors.

**PHIL 3800-3. Open Topics in Philosophy.** Variety of new courses at the 3000 level. See current departmental announcements for specific content. May be repeated up to 6 total credit hours. Prereq., 6 hours of philosophy course work. Restricted to sophomores, juniors and seniors.

**PHIL 3840 (1-3). Independent Study.** May be repeated up to 8 total credit hours. Prereq., 6 hours of philosophy course work. Restricted to juniors/seniors.

**PHIL 3930 (1-3). Internship in Social Policy.** Under the guidance of an official in a governmental or non-governmental organization, students are assigned to projects selected for their academic suitability as well as for value to the sponsoring organization. Prior approval of department required. Prereq., 9 hours in moral or political philosophy course work. Recommended prereqs., PHIL 1200, 2200, and 3200.

**PHIL 4010-3. Single Philosopher.** Intensively studies the work of one historical figure in philosophy, with the aim of reaching a broad understanding of the philosopher's whole body of thought. Philosophers covered include, from year to year, Plato, Aristotle, Augustine, Aquinas, Descartes, Spinoza, Locke, Leibniz, Hume, and Kant. Includes at least one course per year on an ancient author and one course per year on a modern author. May be repeated up to 12 total credit hours. Prereq., 12 hours philosophy course work. Same as PHIL 5010.

**PHIL 4020-3. Topics in the History of Philosophy.** Examines a specific philosophical problem over an extended historical period. May be repeated up to 9 total credit hours. Prereq., 12 hours of philosophy course work, including PHIL 3000 and 3010. Same as PHIL 5020.

**PHIL 4030-3. Medieval Philosophy.** Introduces philosophy from the late Roman era to the 14th century. Philosophers studied may include Augustine, Boethius, Aquinas, and Ockham. Topics range over religion, ethics, mind, and metaphysics. Prereq., 12 hours of philosophy course work.

**PHIL 4040-3. Studies in 20th Century Philosophy.** Studies two or three major philosophies prominent during the last century. Prereq., 12 hours of philosophy course work. Restricted to juniors/seniors.

**PHIL 4070-3. Existentialist Philosophy.** Examines central figures and texts in the existential tradition, from Kierkegaard and Nietzsche to Heidegger and Sartre. Prereq., 12 hours of philosophy course work. Restricted to juniors/seniors.

**PHIL 4080-3. Introduction to Phenomenology.** Examines the work of Edmund Husserl and subsequent phenomenologists (e.g., Heidegger, Sartre, Merleau-Ponty). Prereq., 12 hours of philosophy course work. Restricted to juniors and seniors.

**PHIL 4110-3. Contemporary Moral Theory.** Provides an in-depth look at some recent work in moral theory. Topics covered, varying from year to year, include: consequentialism and its critics; virtue theory; moral psychology; impartiality and the personal point of view. Prereqs., 12 hours philosophy course work, including PHIL 3100; and junior standing. Same as PHIL 5110.

**PHIL 4200-3. Contemporary Political Philosophy.** Provides a survey of recent approaches to political philosophy: liberalism (Rawls, Disorkin); libertarianism (Nozick); communitarianism (Sandel, MacIntyre); and feminism (Jaggar). Topics and readings vary with the instructor. May be repeated up to 6 total credit hours. Prereqs., PHIL 2200, 3200, and 12 hours of philosophy course work. Restricted to juniors and seniors. Same as PHIL 5200.

**PHIL 4210-3. Ancient Political Thought.** Prereq., CLAS/HIST 1051, CLAS/HIST 1061, HIST 1010, PSCI 2004, or PHIL 3000. Restricted to juniors/seniors. Same as CLAS 4041 and HIST 4041.

**PHIL 4250-3. Marxism.** Historical and systematic study of principal themes of Marxist thought, from its Hegelian origins to its contemporary varieties, emphasizing the works of Marx and Engels. Prereq., 12 hours of GRMN or PHIL course work or instructor consent. Restricted to juniors/seniors. Same as GRMN 4251.

**PHIL 4260-3. Philosophy of Law.** Considers philosophical topics concerning law and the U.S. legal system. Topics that may be considered include the nature of law, relations between law and morality, justifications of punishment, the moral duty to obey the law, and law and liberty. Prereq., junior or senior standing and 12 hours in philosophy. Same as PHIL 5260.

**PHIL 4300-3. Philosophy of Mind.** Discusses problems in the philosophy of mind, including the mind-body problem, and such concepts as consciousness, mental representation, and intentionality. Prereqs., PHIL 2440, 3010, 3340, and 3480. Same as PHIL 5300.

**PHIL 4360-3. Metaphysics.** Traditional and contemporary theories of the basic categories of reality and the human relationship to it, including universals, substance, identity, change, mind and body, free will, and modality. Prereqs., PHIL 2440, 3010, 3340, and 3480.

**PHIL 4400-3. Philosophy of Science.** Prereqs., 12 hours PHIL course work including PHIL 2440 or equivalent, and junior standing. Same as PHIL 5400.

**PHIL 4440-3. Topics in Logic.** Provides for offering courses in a variety of topics in logic, including, but not limited to, mathematical logic, philosophical issues in logic, probability theory, decision theory, and inductive logic. Prereq., 12 hours PHIL course work, including PHIL 2440 or equivalent. Restricted to juniors/seniors. May be repeated up to 6 total credit hours. Same as PHIL 5440.

**PHIL 4450-3. History and Philosophy of Physics.** Investigates the role of experiment in physics. Uses case studies in the history and philosophy of physics and in scientific methodology. Prereqs., PHYS 1020 or 1120 or 2020 or instructor consent, 12 hours PHIL course work, and junior standing. Same as PHIL 5450 and PHYS 4450.

**PHIL 4460-3. Modal Logic.** Introduces the most philosophically relevant kind of logic that builds on PHIL 2440. Modal logic is the logic of the concepts of necessity, possibility, and contingency. A variety of systems of sentential modal logic will be covered, along with the standard system of first-order modal logic. Recommended prereq., PHIL 2440. Same as PHIL 5460.

**PHIL 4490-3. Philosophy of Language.** Examines theories and problems regarding the nature of language and its relation to reality. Concepts discussed include sense, reference, conventions, intentions, and their relation to science and social life. Relevant literature includes readings in Frege, Russell, Quine, Putnam, Kripke, and Chomsky. Prereq., PHIL 2440, 12 credit hours of philosophy, and junior standing. Same as PHIL 5490.

**PHIL 4600-1. Theology Forum Seminar.** Discusses a variety of theological and philosophical topics. Some reading, much discussion, occasional guest speakers. May be repeated up to 3 total credit hours with permission of instructor. Prereq., 12 hours of PHIL course work. Restricted to juniors/seniors.

**PHIL 4730-3. Philosophy and Literature.** Examines various relations between philosophy and literature, ranging from the direct incorporation of philosophical doctrine into literature to literature as a distinctive way of practicing philosophy. Prereqs., 12 credit hours of philosophy and junior standing.

**PHIL 4800-3. Open Topics in Philosophy.** A variety of new courses at the 4000 level. See current departmental announcements for specific content. May be repeated up to 6 total credit hours. Prereqs., 12 credit hours of philosophy and junior standing.

**PHIL 4830-3. Senior Seminar in Philosophy.** Critical in-depth examination of a selected philosophical topic. May be repeated up to 6 total credit hours. Prereq., 15 hours of philosophy. Restricted to junior/senior PHIL majors or instructor consent.

**PHIL 4840 (1-3). Independent Study.** May be repeated up to 8 total credit hours. Prereq. 12 hours of philosophy course work. Restricted to seniors.

**PHIL 4950-3. Honors Thesis.** May be repeated up to 6 total credit hours. Prereq., 12 hours of philosophy course work.

**PHIL 5010-3. Single Philosopher.** May be repeated up to 12 total credit hours. Prereq., graduate standing or instructor consent. Same as PHIL 4010.

**PHIL 5020-3. Topics in the History of Philosophy.** May be repeated up to 9 total credit hours. Same as PHIL 4020.

**PHIL 5030-1. Greek Philosophical Texts.** Selected readings in classical philosophy, with a focus on achieving fluency in reading philosophical Greek.

**PHIL 5040-1. Latin Philosophical Texts.** Selected readings in classical and medieval authors, in the original language. The focus is on achieving fluency in reading philosophical Latin.

**PHIL 5100-3. Ethics.** Presents representative positions in normative ethics and metaethics. May be repeated up to 6 total credit hours.

**PHIL 5110-3. Contemporary Moral Theory.** Same as PHIL 4110.

**PHIL 5200-3. Contemporary Political Philosophy.** Same as PHIL 4200.

**PHIL 5210-3. Philosophy and Social Policy.** Studies philosophical approaches to social and political issues such as abortion, bioethics, environmental preservation, human rights, and reverse discrimination. Gives attention to strengths and weaknesses of philosophical treatments of these issues. May be repeated up to 6 total credit hours.

**PHIL 5230-3. Bioethics and Public Policy.** Examines public policy implications of contemporary biological, genetic, biomedical, and behavioral science in light of ethics and human values. Considers theoretical and practical grounds for moral assessment of scientific research and possible applications of technology. May be repeated up to 6 total credit hours.

**PHIL 5240-3. Seminar in Environmental Philosophy.** Philosophical examination of several different approaches to environmental problems: economic, juridical, political, and ecological. Discusses specific environmental problems, focusing on their moral dimensions, e.g., wilderness preservation, animal rights, and land use and urban planning. May be repeated up to 6 total credit hours.

**PHIL 5260-3. Philosophy of Law.** Same as PHIL 4260.

**PHIL 5290 (1-3). Topics in Values and Social Policy.** Deals with topics in the area of philosophy and public policy and is often interdisciplinary in focus. Topics vary from one semester to another. May be repeated up to 7 total credit hours.

**PHIL 5300-3. Philosophy of Mind.** Same as PHIL 4300.

**PHIL 5340-3. Epistemology.** Covers a selection of the following problems: the analysis of knowledge, theories of justification, skepticism, perceptual knowledge, theories of sense experience, other minds, knowledge of the past, the problem of induction, theories of justification, and a priori knowledge.

**PHIL 5360-3. Metaphysics.**

**PHIL 5400-3. Philosophy of Science.** Same as PHIL 4400.

**PHIL 5440-3. Topics in Logic.** Same as PHIL 4440.

**PHIL 5450-3. History and Philosophy of Physics.** Same as PHIL 4450 and PHYS 5450.

**PHIL 5460-3. Modal Logic.** Same as PHIL 4460.

**PHIL 5490-3. Philosophy of Language.** Same as PHIL 4490.

**PHIL 5500-3. Advanced Formal Semantics.** Considers topics in the semantics of natural language not normally covered in first courses in philosophy of language. These include: natural deduction and sequent calculi for conditional logic; interpretation as logical inference; Lambek calculus and applicative categorical grammar; applications such as generalized coordination, plurals, higher-order intentional logic, generics, focus, and event-based semantics. Recommended prereq., PHIL 5490.

**PHIL 5600-3. Philosophy of Religion.** Studies topics falling under philosophy of religion, such as proofs for God's existence, religious language, mysticism, psychology of religion, modern theological movements, miracles, and study of individual theologians. May be repeated up to 6 total credit hours.

**PHIL 5700-3. Aesthetics.** Analyzes the principal topics of aesthetics, including such issues as formal structure of aesthetics, the nature of critical judgments, and the status of the work of art. May be repeated up to 6 total credit hours.

**PHIL 5800-3. Open Topics in Philosophy.** Variety of new courses at the 5000 level. See current departmental announcements for specific content. May be repeated up to 6 total credit hours.

**PHIL 5810 (1-3). Special Topics in Philosophy.** Instructor meets regularly with three or more students to discuss special topics in philosophy. May be repeated up to 6 total credit hours.

**PHIL 5840 (1-3). Graduate Independent Study.** May be repeated up to 6 total credit hours.

**PHIL 6000 (3-4). Seminar in the History of Philosophy.** Studies advanced topics in the history of philosophy. Content varies by semester, but may extend to any period in the history of philosophy, from the Presocratics into the modern era. May be repeated up to 12 total credit hours. Prereq., graduate standing or instructor consent.

**PHIL 6040-3. Seminar: Phenomenology.** May be repeated up to 6 total credit hours.

**PHIL 6100-3. Seminar in Ethics.** Intensive study of selected topics in ethical theory.

**PHIL 6200-3. Seminar in Social and Political Philosophy.** Provides an in-depth look at some particular topic in social and political philosophy, such as rights, political freedom, political obligation, or democracy.

**PHIL 6300-3. Seminar in Philosophy of Mind.** Studies selected topics in philosophy of mind.

**PHIL 6310-3. Issues and Methods in Cognitive Science.** Prereqs., graduate standing, or at least one course at the 3000 level or higher in computer science, linguistics, philosophy, or psychology. No background in computer science is presumed. Same as CSCI 6402, EDUC 6504, LING 6200, and PSYC 6200.

**PHIL 6340-3. Seminar in Epistemology.** Studies some of the main topics of epistemology, such as skepticism, foundations of knowledge, perception, introspection, belief, certainty, and analytic-synthetic distinctions.

**PHIL 6380-3. Seminar in Metaphysics.** Traditional and contemporary theories of the basic categories used to describe nature and the human relationship to it, including such concepts as substance, identity, space and time, causality, determination, and systematic ontology.

**PHIL 6400-3. Seminar in Philosophy of Science.** Topics connected with development of nature of science; structure of scientific theories; testing of hypotheses. Theory of decisions in science and ethics. Basic conceptions and models of abstraction in the history of science.

**PHIL 6490-3. Seminar in Philosophy of Language.** Studies some of the main topics in the philosophy of language, such as meaning and theories of meaning, translation, speech acts, rules of language, reference, relevance of psycholinguistics, language and thought, and language and ontology.

**PHIL 6940 (1-3). Master's Candidate for Degree.** May be repeated up to 7 total credit hours.

**PHIL 6950 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours.

**PHIL 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Physics

**PHYS 1000-3. Preparatory Physics.** Introduces basic physics, emphasizing an analytical approach to prepare for PHYS 1110/1120, the engineering majors sequence. This course does not satisfy any MAPS deficiency in either the sciences or math. Prereq., 1 year high school algebra or equivalent.

**PHYS 1010-3. Physics of Everyday Life 1.** Intended primarily for nonscientists, this course covers physics encountered in everyday life. Topics include balls, scales, balloons, stoves, insulation, light bulbs, clocks, nuclear weapons, basics of flashlights, and microwave ovens. Prereq., high school algebra or equivalent. Meets MAPS requirements for natural sciences: chemistry or physics. However, this course should not be taken if the student has a MAPS deficiency in math. Approved for arts and sciences core curriculum: natural science or quantitative reasoning and mathematical skills.

**PHYS 1020-4. Physics of Everyday Life 2.** Intended primarily for nonscientists, this course is a continuation of PHYS 1010. Includes electrical power generation and distribution, electrical motors, radio, television, computers, copiers, lasers, fluorescent lights, cameras, and medical imaging. Prereqs., PHYS 1010

and high school algebra. Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills or natural science.

**PHYS 1110-4. General Physics 1.** Three lect., one rec. per week, plus three evening exams in the semester. First semester of three-semester calculus-based sequence for science and engineering students. Covers kinematics, dynamics, momentum of particles and rigid bodies, work and energy, gravitation, simple harmonic motion, and introduction to thermodynamics. Coreq., APPM 1350 or MATH 1300. Credit not granted for this course and PHYS 1170. Approved for arts and sciences core curriculum: natural science.

**PHYS 1120-4. General Physics 2.** Three lect., one rec. per week, plus three evening exams in the semester. Second semester of three-semester introductory calculus-based sequence for science and engineering students. Covers electricity and magnetism, wave motion, and optics. Normally is taken concurrently with PHYS 1140. Prereq., PHYS 1110. Coreq., MATH 2300 or APPM 1360. Credit not granted for this course and PHYS 1180. Approved for arts and sciences core curriculum: natural science.

**PHYS 1140-1. Experimental Physics 1.** Introduction to experimental physics through laboratory observations of a wide range of phenomena. Course covers experiments on physical measurements, linear and rotational mechanics, harmonic motion, wave motion, sound and heat, electricity and magnetism, optics, and electromagnetic waves with the mathematical analysis of physical errors associated with the experimental process. One lect., one 2-hour lab per week. Prereq., PHYS 1110; prereq. or coreq., PHYS 1120. Approved for arts and science core curriculum: natural science.

**PHYS 1150-1. Experimental Physics 2.** For students in Physics Plan 3 teaching track only. Students complete another full set of PHYS 1140 experiments (seven different labs from those previously completed). Registration by special arrangements with the Department of Physics. Prereqs., PHYS 1110 and 1120. Same as PHYS 1140.

**PHYS 1230-3. Light and Color.** Discusses light, color, vision, and perception. Covers reflection, refraction, lenses, and applications to photography and other methods of light sensing. Other topics include lasers and holography. Course is geared toward nonscience majors. Meets MAPS requirements for natural science: chemistry or physics. Should not be taken by students with a math MAPS deficiency. Approved for arts and science core curriculum: natural science.

**PHYS 1240-3. Sound and Music.** Explores the physical processes that underlie the diversity of sound and musical phenomena. Topics covered include the physical nature of sound, the perception of sound, the perception of pitch and harmony, musical instruments, synthesizers and samplers, and room acoustics. Nonmathematical; geared toward nonscience majors. Meets MAPS requirement for natural science: chemistry or physics. Should not be taken by students with a math MAPS deficiency. Approved for arts and sciences core curriculum: natural science.

**PHYS 2010-5. General Physics 1.** Three demonstration lect., one two-hour lab/rec. week, plus three evening exams in the semester. Covers mechanics, heat, and sound. Elementary but thorough presentation of fundamental facts and principles of physics. Natural science majors with a knowledge of calculus and others taking calculus are urged to consider taking the calculus-based courses PHYS 1110, 1120, 1140, and 2130, rather than PHYS 2010 and PHYS 2020. This course is designed for premed students in the biological sciences. Prereq., ability to use high school algebra and trigonometry. Meets MAPS requirements for natural science. Approved for arts and sciences core curriculum: natural science.

**PHYS 2020-5. General Physics 2.** Three demonstration lect., one two-hour lab/rec. per week, plus three evening exams in the semester. Covers electricity and magnetism, light, and modern physics. Natural science majors with a knowledge of calculus and others taking calculus are urged to take the calculus-based courses PHYS 1110, 1120, 1140, and 2130, rather than PHYS 2010 and PHYS 2020. This course is designed for premed students and students in the biological sciences. Prereq., PHYS 2010. Approved for arts and sciences core curriculum: natural science.

**PHYS 2130-3. General Physics 3.** Third semester of introductory sequence for science and engineering students except physics majors and those studying computer applications in physics (for these, see PHYS 2170). Covers special relativity, quantum theory, atomic physics, solid state, and nuclear physics.

Physics majors should take PHYS 2170 instead of PHYS 2130. Prereqs., PHYS 1120, 1140, or ECEN 2250, 3400. Coreq., MATH 2400. Normally taken with PHYS 2150.

**PHYS 2150-1. Experimental Physics.** One lect., one 2-hour lab per week. Includes many experiments of modern physics, including atomic physics, solid state physics, electron diffraction, radioactivity, and quantum effects. Normally taken concurrently with PHYS 2130 or PHYS 2170 but students may take PHYS 2150 after taking PHYS 2130 or 2170. Prereqs., PHYS 1120 and 1140.

**PHYS 2160-1. Experimental Physics.** For students in Physics Plan 3 teaching track only. Students do another full set of PHYS 2150 experiments (seven different labs from those previously completed). Registration by special arrangements with the Department of Physics. Prereqs., PHYS 1120 and 1140. Same as PHYS 2150.

**PHYS 2170-3. Foundations of Modern Physics.** For physics majors in plans 1 and 2 and those studying computer applications in physics. Completes the three-semester sequence of general physics. Emphasizes developing skills for physics majors. Includes relativity, quantum mechanics, atomic structure. Normally taken with the laboratory PHYS 2150. Prereq., PHYS 1120. Coreq., MATH 2400 or APPM 2350.

**PHYS 2210-3. Classical Mechanics and Mathematical Methods 1.** Theoretical Newtonian mechanics, including position and velocity dependent forces, oscillation, stability, non-inertial frames and gravitation from extended bodies. Ordinary differential equations, vector algebra, curvilinear coordinates, complex numbers, and Fourier series will be introduced in the context of the mechanics. Prereqs., PHYS 2130 or 2710, MATH 2400 or APPM 2350. Coreq., APPM 2360. Credit not granted for this course and PHYS 2140.

**PHYS 2810 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. May be repeated up to 7 total credit hours.

**PHYS 2840 (1-3). Independent Study.** Selected topics for undergraduate independent study. Subject matter to be arranged. May be repeated up to 7 total credit hours.

**PHYS 3000-3. Science and Public Policy.** For nonscience majors. Reading, discussions, debates, and lectures are used to study how science affects society economically, intellectually, and in terms of health and national security. Another focus is how government fosters and funds scientific activities. Recommended prereq., completion of core science requirement.

**PHYS 3050-3. Writing in Physics: Problem-Solving and Rhetoric.** Teaches strategies used in scientific writing with an emphasis on argument, reviews and reinforces essential writing skills, provides experience in writing both academic and professional communications in a style appropriate to the literature of physics. Prereqs., PHYS 2130 or 2170 and lower-division core writing requirement. Approved for arts and sciences core curriculum: written communication.

**PHYS 3070-3. Energy and the Environment.** Contemporary issues in energy consumption and its environmental impact, including fossil fuel use and depletion; nuclear energy and waste disposal; solar, wind, hydroelectric, and other renewable sources; home heating; energy storage; fuel cells; and alternative transportation vehicles. Included are some basic physical concepts and principles that often constrain choices. No background in physics is required. Approved for arts and sciences core curriculum: natural science. Same as ENVS 3070.

**PHYS 3210-3. Classical Mechanics and Mathematical Methods 2.** Lagrangian and Hamiltonian treatment of theoretical mechanics, including coupled oscillations, waves in continuous media, central force motion, rigid body motion and fluid dynamics. The calculus of variations, linear algebra, tensor algebra, vector calculus, and partial differential equations will be introduced in the context of the mechanics. Prereqs., PHYS 2210, APPM 2360, or equivalent.

**PHYS 3220-3. Quantum Mechanics and Atomic Physics 1.** Introduces quantum mechanics with wave, operator, and matrix computational techniques. Investigates solutions for harmonic oscillator, potential well, and systems with angular momentum. Develops a quantitative description of one-electron atoms in lowest order. Prereqs., PHYS 2130 or 2170, 2210, and 3210. Coreq., PHYS 3310.

**PHYS 3221-1. Tutorial Practicum for Quantum Mechanics 1.** Uses interactive group work to aid student learning in co-requisite course PHYS 3220. In this

tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content. Coreq., PHYS 3220.

**PHYS 3310-3. Principles of Electricity and Magnetism 1.** Covers mathematical theory of electricity and magnetism, including electrostatics, magnetostatics, and polarized media, and provides an introduction to electromagnetic fields, waves, and special relativity. Prereqs., PHYS 2210 and 2130 or 2170.

**PHYS 3311-1. Tutorial Practicum for Electricity & Magnetism 1.** Uses interactive group work to aid student learning in co-requisite course PHYS 3310. In this tutorial, students will work in small groups to practice how to solve challenging problems and their underlying conceptual basis, as well as using hands-on activities, demonstrations, and other techniques to help learn content. Coreq., PHYS 3310.

**PHYS 3320-3. Principles of Electricity and Magnetism 2.** Continuation of PHYS 3310. Electromagnetic induction; magnetic energy; microscopic theory of magnetic properties; AC circuits; Maxwell's Equations; plane waves; waveguides and transmission lines; radiation from electric and magnetic dipoles and from an accelerated charge. Prereq., PHYS 3310.

**PHYS 3330-2. Electronics for the Physical Sciences.** One lect. and one 3-hour lab per week. Introduces laboratory electronics for physical science students. Includes basic electronic instruments, dc bridge circuits, operational amplifiers, bipolar transistors, field-effect transistors, photodiodes, noise in electronic circuits, digital logic, and microcontrollers. Students gain hands-on experience in designing, building, and debugging circuits. Concludes with a three-week project in which students design and build an experiment of their choice and present a seminar on the results. Prereq., PHYS 2150 and 2130 or 2170.

**PHYS 3340-3. Introductory Research in Optical Physics.** Two lect., one three-hour lab plus variable unsupervised labs each week. Students design and build their own experiments using a modular type of optical research kit. Experiments cover basic research methods in instrument design, laser physics, Fourier optics, holography, spectroscopy, and interferometry. Students learn how to plan major projects and evaluate critically the significance of results. Course concludes with a four-week major project. Prereq., PHYS 3330.

**PHYS 4130-3. Biological Electron Microscopy: Principles and Recent Advances.** Prereq., EBIO 1220, or MCDB 1150, or MCDB 4500/5500, or PHYS 1120, or 2020, or instructor consent. Same as PHYS 5130 and MCDB 4130.

**PHYS 4150-3. Plasma Physics.** Discusses the fundamentals of plasma physics, including particle motion in electromagnetic fields, wave propagation, collisions, diffusion, and resistivity. Presents examples from space plasmas, astrophysical plasmas, laboratory fusion plasmas, and plasmas in accelerators. Prereqs., PHYS 1110-1120, and MATH 2400 or APPM 2350. Coreq., PHYS 3310.

**PHYS 4230-3. Thermodynamics and Statistical Mechanics.** Statistical mechanics applied to macroscopic physical systems; statistical thermodynamics, classical thermodynamics systems; applications to simple systems. Examines relationship of statistical to thermodynamic points of view. Prereqs., PHYS 3220 and APPM 2360.

**PHYS 4340-3. Introduction to Solid State Physics.** Primarily for senior physics majors. Discusses crystal structure, lattice dynamics, band theory, semiconductors, and ferromagnetism. Prereq., PHYS 3220. Same as ECEN 4345.

**PHYS 4410-3. Quantum Mechanics and Atomic Physics 2.** Extends quantum mechanics to include perturbation theory and its applications to atomic fine structure, interactions with external forces, the periodic table, and dynamical processes including electromagnetic transition rates. Prereq., PHYS 3320. Coreqs., PHYS 3220.

**PHYS 4420-3. Nuclear and Particle Physics.** Introduces structure of the atomic nucleus, spectroscopy of subnuclear particles, scattering, reactions, radioactive decay, fundamental interactions of quarks and leptons. Prereq., PHYS 4410.

**PHYS 4430-3. Introduction to Research in Modern Physics.** One lect., one lab per week to be taken with PHYS 4410. Experiments introduce students to realities of experimental physics so they gain a better understanding of theory and an appreciation of the vast amount of experimental work done in the

physical sciences today. Prereqs., PHYS 3220 and 3320. Coreq., PHYS 4410. Same as PHYS 5430.

**PHYS 4450-3. History and Philosophy of Physics.** Investigates the role of experiment in physics; case studies in the history and philosophy of physics and in scientific methodology. Prereq., PHYS 1020 or 1120 or 2020 or instructor consent. Same as PHYS 5450, PHIL 4450.

**PHYS 4460-3. Teaching and Learning Physics.** Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching and education research. Prereq., PHYS 3210 and 3310 or instructor consent. Same as PHYS 5460 and EDUC 5460.

**PHYS 4510-3. Optics.** Basic electromagnetic theory of light, using Maxwell's equations. Examples in geometrical optics; extensive applications in physical optics including diffraction and polarization. Spectra, including Zeeman effect and fluorescence. Recent advances in experimental techniques: micro-waves, lasers, image converters. Prereq., PHYS 3320.

**PHYS 4610-2. Physics Honors.** Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4620 and PHYS 4630. Prereq., 3.00 GPA. Registration by special arrangement with the Department of Physics.

**PHYS 4620-2. Physics Honors.** Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4630. Prereq., 3.00 GPA. Registration by special arrangement with the Department of Physics.

**PHYS 4630-2. Physics Honors.** Students are matched with a faculty member and work independently on a research topic. Typically, the honors program lasts three semesters. A senior thesis and an oral presentation of the work are required. See also PHYS 4610 and PHYS 4620. Prereq., 3.00 GPA. Registration by special arrangement with the Department of Physics.

**PHYS 4810 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. See also PHYS 4820 and PHYS 4830. May be repeated up to 7 total credit hours.

**PHYS 4840 (1-3). Independent Study.** Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4850. May be repeated up to 7 total credit hours.

**PHYS 4850 (1-3). Independent Study.** Selected topics for undergraduate independent study. Subject matter to be arranged. See also PHYS 4840. May be repeated up to 7 total credit hours.

**PHYS 4970-3. Seminar on Physical Methods in Biology.** Prereq., PHYS 1120 or 2020, and MCDB 1060 or 1150, or EBIO 1220, or instructor consent. Same as PHYS 5970 and MCDB 4970.

**PHYS 5030-3. Intermediate Mathematical Physics 1.** This course and its continuation, PHYS 5040, form a survey of classical mathematical physics. Studies complex variable theory and finite vector spaces, and includes topics in ordinary and partial differential equations, boundary value problems, potential theory, and Fourier analysis. Prereqs., MATH 4310 and 4320. Same as MATH 5030.

**PHYS 5040-3. Intermediate Mathematical Physics 2.** Continuation of PHYS 5030. Includes group theory, special functions, integral transforms, integral equations, and calculus of variations. Prereq., PHYS 5030. Same as MATH 5040.

**PHYS 5130-3. Biological Electron Microscopy: Principles and Recent Advances.** Same as PHYS 4130 and MCDB 5130.

**PHYS 5141-3. Astrophysical and Space Plasmas.** Covers magnetohydrodynamics and a few related areas of plasma physics applied to space and astrophysical systems, including planetary magnetospheres and ionospheres, stars, and interstellar gas in galaxies. Prereq., graduate standing in astrophysical and planetary science or physics. Same as ASTR 5140.

**PHYS 5150-3. Introductory Plasma Physics.** Includes basic phenomena of ionized gases, static and dynamic shielding, linear waves, instabilities, particles in fields, collisional phenomena, fluid equations, collisionless Boltzman equations, Landau damping, scattering and absorption of radiation in plasmas, elementary nonlinear processes, WKB wave theory, controlled thermonuclear fusion concepts, astrophysical applications, and experimental plasma physics (laboratory). Prereq., PHYS 3310. Same as ASTR 5150.

**PHYS 5160-3. Fundamentals of Optics and Lasers.** Covers the basic physics of lasers. Topics include basics of optical resonators and gaussian beam propagation, stimulated emission, laser threshold conditions, laser linewidth, q-switching and mode locking of lasers, tuning of CW lasers, and specifics of various common lasers.

**PHYS 5210-3. Theoretical Mechanics.** Variational principles, Lagrange's equations, Hamilton's equations, motion of rigid body, relativistic mechanics, transformation theory, continuum mechanics, small oscillations, Hamilton-Jacobi theory. Coreq., PHYS 5250.

**PHYS 5220-3. Nonlinear Dynamics.** Conservative systems: canonical perturbation theory, adiabatic invariants, surface of section, overlap criterion, orbit stability, quasilinear diffusion, renormalization analysis of transition to chaos. Bifurcation theory: center manifolds, normal forms, singularity theory. Dissipative systems: strange attractors, renormalization analysis of period doubling, intermittency. Prereq., PHYS 5210. Same as ATOC 5220.

**PHYS 5250-3. Introduction to Quantum Mechanics 1.** Quantum phenomena, Ehrenfest theorem and relation to classical physics, applications to one-dimensional problems, operator techniques, angular momentum and its representations, bound states and hydrogen atom, and Stern-Gerlach experiment and spin and spinor wave function. Prereqs., PHYS 3220 and 4410. Coreq., PHYS 5210.

**PHYS 5260-3. Introduction to Quantum Mechanics 2.** Symmetries and conservation laws, identical particle systems, approximation techniques (including time-dependent and time-independent perturbation theories and variational techniques) and their applications, scattering theory, radiative transitions, and helium atom. Prereq., PHYS 5250.

**PHYS 5430-3. Introduction to Research in Modern Physics.** Same as PHYS 4430.

**PHYS 5450-3. History and Philosophy of Physics.** Same as PHYS 4450 and PHIL 5450.

**PHYS 5460-3. Teaching and Learning Physics.** Same as PHYS 4460 and EDUC 5460.

**PHYS 5606-3. Optics Laboratory.** Consists of 13 optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers, and holograms, and experimentation of fiber optics and Fourier optics. Prereq., undergraduate optics course such as PHYS 4510. Same as ECEN 5606.

**PHYS 5770-3. Gravitational Theory (Theory of General Relativity).** Presents Einstein's relativistic theory of gravitation from geometric viewpoint; gives applications to astrophysical problems (gravitational waves, stellar collapse, etc.).

**PHYS 5840 (1-3). Selected Topics for Graduate Independent Study.** Subject matter to be arranged. May be repeated up to 7 total credit hours.

**PHYS 5970-3. Seminar: Physical Methods in Biology.** Same as PHYS 4970 and MCDB 5970.

**PHYS 6260-3. Geometry of Quantum Fields and Strings.** Focuses on differential geometric techniques in quantum field and string theories. Topics include spinors, Dirac operators, index theorem, anomalies, geometry of superspace, supersymmetric quantum mechanics and field theory, and nonperturbative aspects in field and string theories. Prereq., MATH 6230, PHYS 5250, or instructor consent. Recommended prereqs., MATH 6240 and PHYS 7280. Same as MATH 6260.

**PHYS 6610-3. Earth and Planetary Physics 1.** Same as GEOL 6610 and ASTR 6610.

**PHYS 6620-3. Earth and Planetary Physics 2.** Same as GEOL 6620 and ASTR 6620.

**PHYS 6630-3. Earth and Planetary Physics 3.** Same as GEOL 6630 and ASTR 6630.

**PHYS 6650 (1-3). Seminar in Geophysics.** Same as GEOL 6650 and ASTR 6650.

**PHYS 6670-2. Geophysical Inverse Theory.** Prereqs., calculus, computer programming (any language). Same as GEOL 6670.

**PHYS 6940 (1-3). Master's Degree Candidate.**

**PHYS 6950 (1-6). Master's Thesis.** Approved problem in theoretical or experimental physics under the direction of staff members. Intended to introduce the student to procedures in research and development work. Work of an original nature expected.

**PHYS 7160-3. Intermediate Plasma Physics.** Continuation of PHYS 5150. Topics vary yearly but include nonlinear effects such as wave coupling, quasilinear relaxation, particle trapping, nonlinear Landau damping, collisionless shocks, solutions; nonneutral plasmas; kinetic theory of waves in a magnetized plasma; anisotropy; inhomogeneity; radiation—ponderomotive force, parametric instabilities, stimulated scattering; plasma optics; kinetic theory, and fluctuation phenomena. Prereq., PHYS 5150 or instructor consent. Same as ASTR 7160.

**PHYS 7230-3. Statistical Mechanics.** Classical and quantum statistical theory, including study of both equilibrium and nonequilibrium systems. Topics covered include kinetic theory, degenerate gases, macrocanonical and grand canonical ensembles, and irreversible processes. Prereq., PHYS 5250 and 5260.

**PHYS 7240-3. Advanced Statistical Mechanics.** Introduces current research topics in statistical mechanics. Topics vary from year to year and may include phase transitions, critical phenomena, nonequilibrium phenomena, dense fluids, dynamical systems, plasma physics, or quantum statistical mechanics. Prereq., PHYS 7230.

**PHYS 7270-3. Introduction to Quantum Mechanics 3.** Radiation theory; relativistic wave equations with simple applications; introduction to field theory and second quantization.

**PHYS 7280-3. Advanced Quantum Theory.** Quantum theory of fields, elementary particles, symmetry laws, and topics of special interest. Prereq., PHYS 7270 or instructor consent.

**PHYS 7310-3. Electromagnetic Theory 1.** Sophisticated approach to electrostatics, boundary value problems, magnetostatics, applications of Maxwell's equations to electromagnetic wave propagation, wave guides, and resonant cavities and magnetohydrodynamics. See also PHYS 7320. Prereq., PHYS 5030.

**PHYS 7320-3. Electromagnetic Theory 2.** This is a continuation of PHYS 7310. Topics include relativistic particle dynamics; radiation by moving charges; multiple fields; radiation damping and self-fields of a particle; collisions between charged particles and energy loss; radiative processes; and classical field theory. See also PHYS 7310. Prereq., PHYS 7310.

**PHYS 7430-3. Soft Condensed Matter Physics.** Introduces the science of liquid crystals, polymers, biological membranes, biopolymers, block copolymers, molecular monolayers, colloids, nanoparticle suspensions, emulsions, foams, gels, elastomers, and other soft materials. Topics vary from term to term and the course is geared toward graduate students with diverse preparation backgrounds, including students from the Physics Department as well as other science and engineering departments.

**PHYS 7440-3. Theory of the Solid State.** Stresses application to the solid state of physical concepts basic to much of modern physics, single-particle approximation, and the energy-band description of electron states in solids, pseudopotential theory applied to ordered and disordered systems, dynamical behavior of electrons in solids, lattice dynamics, Hartree-Fock and random-phase approximation in solids, many-body aspects of magnetism, and superconductivity.

**PHYS 7450-3. Theory of Solid State 2.** The second semester of condensed matter physics covers topics in soft condensed matter physics, liquid crystals, semiconductors, Quantum Hall effect, Fractional Quantum Hall effect, superconductivity, and other topics at the discretion of the instructor.

**PHYS 7550-3. Atomic and Molecular Spectra.** Covers theory of atomic structure and spectra, including coupling of angular momenta, tensor operators, energy levels, fine and hyperfine structure, transition probabilities, Zeeman and Stark effects. Molecular spectra: electronic, vibrational, and rotational states. Rotation matrices, symmetric top.

**PHYS 7730-3. Theory of Elementary Particles.** Systematics of elementary particles, leptons, quarks, gauge bosons, symmetries and symmetry breaking, scattering cross sections, decay rates, electron-positron annihilation, lepton scattering and hadron structure, quantum chromodynamics, electroweak interactions, gauge theories.

**PHYS 7810, 7820, and 7830 (1-3). Special Topics in Physics.** Various topics not normally covered in the curriculum; offered intermittently depending on student demand and availability of instructors. May be repeated up to 7 total credit hours.

**PHYS 7840 (1-3). Selected Topics for Graduate Independent Study.** Subject matter to be arranged. May be repeated up to 7 total credit hours. Same as PHYS 7850.

**PHYS 7850 (1-3). Selected Topics for Graduate Independent Study.** Subject matter to be arranged. May be repeated for a total of 7 credit hours. Same as PHYS 7840.

**PHYS 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Political Science

### American

**PSCI 1970-3. Legal Rights of Students.** Focuses on educational law and legal rights of students. Restricted to students in the Sewall Residential Academic Program.

**PSCI 1101-3. The American Political System.** Emphasizes interrelations among levels and branches of government, formal and informal institutions, processes, and behavior. Meets MAPS requirement for social science: general or U.S. history. Approved for arts and sciences core curriculum: contemporary societies or United States context.

**PSCI 2481-3. Introduction to the Legal Process.** Covers basic legal concepts and processes emphasizing the American system. Gives special attention to political functions of law. Recommended as preparation for PSCI 4241 and 4251. Prereq., PSCI 1101.

**PSCI 3011-3. The American Presidency.** Covers constitutional and institutional foundations and historical development of the presidency; roles, powers, selection, recent modifications, and institutionalization. Uses lectures and class discussion. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3021-3. U.S. Campaigns and Elections.** Introduces students to the subjects, techniques, and findings of Political Science research on campaigns and elections. Particular emphasis is placed on the study of voting, campaign effects, partisan coalitions, electoral rules, campaign finance, and the policy impact of elections. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3031-3. Political Parties and Interest Groups.** Highlights the practice of party politics in the United States, including the nature, structure, organization, and functions of political parties and interest groups. Analyzes interest group politics and political behavior. Prereq., PSCI 1101.

**PSCI 3041-3. The American Congress.** Provides intensive examination of the role of Congress in American government, including congressional elections, representation, the organization of Congress, and congressional policy making. Examines larger context of congressional politics, including political parties, the president, and interest groups. Prereq., PSCI 1101.

**PSCI 3051-3. Public Opinion and Political Behavior.** Examines measurement of public opinion and evaluation of its impact on governmental policy forma-

tion, including survey research techniques and field work in opinion sampling. Prereq., PSCI 1101.

**PSCI 3061-3. State Government and Politics.** Examines politics in the American states from a comparative and historical perspective. Considers major political actors—interest groups, citizens (direct democracy), and political parties, as well as central institutions, in the state political arena. Also focuses on major state public policy concerns. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3071-3. Urban Politics.** Examines the structure of political, social, and economic influence in urban areas. Focuses on the relationship of the political system to governmental, social, and economic institutions and the contemporary policy processes in American cities. Prereq., PSCI 1101 or 2111. Approved for arts and sciences core curriculum: United States context.

**PSCI 3091-3. Politics of Social Movements.** Examines theoretical and empirical research on social movements from a U.S. perspective. Considers why social movements arise, who participates in them, the tactics they employ, obstacles they face, and their political impact. Prereq., PSCI 1101.

**PSCI 3101-3. Black Politics.** Examines structure of political, social, and economic influence in urban areas. Focuses on the relationship of political processes to governmental, social, and economic institutions and contemporary policy processes in American cities. Prereq., PSCI 1101. Restricted to sophomores/juniors/seniors. Same as ETHN 3012. Approved for arts and sciences core curriculum: human diversity or contemporary societies.

**PSCI 3171-3. Government and Capitalism in the United States.** Examines competing theoretical approaches to questions related to origins, development, and purposes of modern government in the United States; particular attention paid to impact of transformations in the underlying structure of the capitalist economy. Prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 3191-3. National Security Organization and Policy Making.** Analyzes how the American governmental and political system is structured to define, select, and implement national security policies. Examines roles of the president, Congress, bureaucracy, interest groups, and other actors. Prereq., PSCI 1101.

**PSCI 3261-3. The Judicial System.** Examines principal actors in the legal system (police, lawyers, judges, citizens) and roles they play in the political process. Also examines differential treatment of varying economic groups. Prereq., PSCI 1101.

**PSCI 3271-3. Law and Society: The Interaction between Legal Institutions and Human Behavior.** Examines relationship between human behavior and legal system, looking closely at the voluntary relationship between the citizen and the state, the use of law to balance economic liberty and equality, support for civil liberties, and procedural, distributive, and retributive justice. Prereq., PSCI 1101.

**PSCI 3301-3. Gender, Sexuality and U.S. Law.** Contemporary and historic overview of U.S. courts' treatment of sex and gender. Using the case method, examines policy issues including, but not limited to: same sex marriage and civil unions; privacy; affirmative action; abortion; reproductive technologies; and discrimination based on sex and sexual orientation in education and in the workplace. Prereq., WMST 2000 and PSCI 1101. Same as WMST 3300. Approved for arts and sciences core curriculum: human diversity.

**PSCI 4021-3. Legislatures and Legislation.** Focuses on the structure and organization of legislatures and process of statute lawmaking. Recommended prereq., PSCI 1101. Approved for arts and sciences core curriculum: United States context.

**PSCI 4081-3. Icons of the American Republic.** Examines the founding period of the United States through the events, political concepts and individuals depicted in the art exhibited in the U.S. Capitol Building in Washington, DC. The course includes a visit to the U.S. Capitol Building, the floor of the U.S. House of Representatives, the floor of the U.S. Senate, and an exploration of the legislative process. Prereq., PSCI 1101 or 2012 or 2223 or 2004. Restricted to students with a minimum 3.4 GPA and 60 credit hours completed.

**PSCI 4111-3. Urban Problems and Public Policies.** Critically examines public policies designed to deal with major social, economic, and political problems facing contemporary American cities. Emphasizes evaluation of urban pro-

grams in welfare, education, crime, housing, and urban economic vitality. Prereq., PSCI 1101.

**PSCI 4131-3. Latinos and the U.S. Political System.** Examines the political status and activities of Mexican Americans and other Latino groups (Cuban Americans and Puerto Ricans) in the U.S. Also covers Latino political attitudes and behaviors; Latino efforts to influence the major national, state, and local institutions of the American government; and public policy concerns of Latinos. Recommended prereq., PSCI 1101. Restricted to sophomores/juniors/seniors. Same as ETHN 4136. Approved for arts and sciences core curriculum: human diversity.

**PSCI 4161-3. Political Rights and Political Morality.** Examines the place of rights in American politics. Analyzes the central role political morality plays in the resolution of conflicting and competing rights. Prereq., PSCI 1101.

**PSCI 4221-3. Political Psychology.** Examines the psychological foundations of political decision-making among citizens and elites. Considers the role of political psychology in explaining political behavior and outcomes at the individual and collective level. Prereq., PSCI 1101.

**PSCI 4241-3. Constitutional Law 1.** Focuses on the nature and scope of American constitutional principles as developed by the U.S. Supreme Court: federalism, jurisdiction of the federal courts, separation of powers, the taxing power, and the commerce power. Involves the case method. Prereq., PSCI 1101 and junior or senior standing.

**PSCI 4251-3. Constitutional Law 2.** Continuation of PSCI 4241. Emphasizes war power, powers of the president, citizenship, the Bill of Rights, and the Civil War amendments. Involves the case method. Not open to freshmen. Prereq., PSCI 1101 or instructor consent.

**PSCI 4341-3. Political Communication, Persuasion, and Public Policy.** Addresses the idea of political communication as a central aspect of policymaking and how the inability to develop persuasive political arguments in particular circumstances invites policy failure. Examines aspects of political communication as it applies to citizens, political decision makers, and specific public policies. Prereq., PSCI 1101 or instructor consent. Restricted to juniors and seniors.

**PSCI 4701-3. Symbolic Politics.** Introduces uses and abuses of symbols as instruments and indicators of political change. Prereq., PSCI 1101. Recommended prereq., junior or senior standing.

**PSCI 4721-3. Rethinking American Politics.** Examines the political history and development of the United States of America. Looks at the particular policy choices we have made and examines the future political agenda. Prereqs., junior or senior standing and PSCI 1101 recommended.

**PSCI 4731-3. Progress and Problems in American Democracy.** Closely examines the various understandings of democracy, the arguments for and against democracy, and the progress of and prospects for democratic politics in the United States. Particular attention is paid to economic, social, and political developments in the United States that affect popular sovereignty, political equality, and liberty. Prereq., PSCI 1101. Restricted to juniors and seniors.

**PSCI 4751-3. The Politics of Ideas.** Examines theoretical arguments and case studies of interactions of ideas, interests, and institutions in policymaking. Analyzes processes through which ideas come to the public agenda, how institutional settings shape those ideas, and why some ideas and interests are more successful. Prereq., PSCI 1101. Restricted to juniors and seniors.

**PSCI 4761-3. Rethinking Political Values.** Encourages intellectual discipline and critical thinking by examining pressing political values from multiple analytic perspectives. Enables students to participate in oral and written discussions. Prereq., PSCI 1101. Restricted to juniors and seniors.

**PSCI 4771-3. Civil Rights and Liberties in America.** Implementation of rights and liberties in America. Examines fundamental issues of free speech, press, association, and religion along with rights to due process and equal protection under the law. Prereq., PSCI 2481. Restricted to juniors/seniors.

**PSCI 4841 (1-3). Independent Study in American Politics.** Subjects are chosen and arrangements are made to suit the needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the

minimum requirements in the political science major. A special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 1101.

**PSCI 5901 (1-3). Topics in Political Science.** Not a free option; must be approved by the student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7901.

**PSCI 6901 (1-3). Graduate Research Topic.** Independent research in a topic of special interest. Arrangements are made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8901.

**PSCI 6951 (1-4). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7011-3. Seminar: American Politics.** Core field seminar for students of American politics. Course work emphasizes the diversity of contemporary research on American political history, political institutions, and political behavior. Restricted to graduate students or instructor consent required.

**PSCI 7021-3. Latinos and U.S. Politics.** Examines in depth the theoretical and empirical literature assessing the political situation and activities of Latinos (Mexican Americans, Puerto Ricans, Cuban Americans, and others) in the U.S. Stresses original research. Restricted to graduate students or instructor consent required.

**PSCI 7031-3. Seminar: Political Attitudes and Behavior.** Provides an intensive examination of topics in political attitudes and behavior such as political participation, ideology, voting, and elite behavior. Reviews methodology of behavioral research and introduces ICPSR data archive and computer-based research. Restricted to graduate students or instructor consent required.

**PSCI 7051-3. Seminar: The United States Congress.** Comprehensively examines literature and selected research topics concerning the United States Congress. Restricted to graduate students or instructor consent required.

**PSCI 7071-3. Seminar: Behavioral Study of Public Law.** Provides an intensive, critical examination of theoretical and substantive literature dealing with the behavior of the primary actors in the legal system—police, lawyers, judges, and citizens. Emphasizes empirical approach and quantitative methods. Requires research papers. Restricted to graduate students or instructor consent required. Formerly PSCI 7077.

**PSCI 7091-3. Politics of Social Movements.** Examines theoretical and empirical research on American social movements. Emphasizes the role of movements as political actors and their ability to bring about changes in public policy and national political institutions. Restricted to graduate students or instructor consent required.

**PSCI 7111-3. Seminar: American Political Institutions.** Intensive examination of the structure and rules of different political institutions in the United States. Explores both the changing approaches to the study of American political institutions as well as many of the major research topics on the presidency, Congress, the judiciary, and the bureaucracy. Restricted to graduate students or instructor consent required.

**PSCI 7121-3. Black Leadership and Public Policy.** Examines the writings of African American political leaders, public policy critics, and politicians who have influenced black politics and society since 1900. Explores the ideas and leadership of W.E.B. DuBois, E. Franklin Frazier, Martin Luther King Jr., and others. Restricted to graduate students or instructor consent required.

**PSCI 7141-3. The Political Economy of American Politics.** Intensive examination of pluralist, voter-centered, rational choice, and neo-Marxist literature on the American state. Restricted to graduate students or instructor consent required.

**PSCI 7151-3. American Subnational Politics and Government.** Provides a comprehensive overview of the issues and literature concerning American "subnational" politics. Considers three bodies of literature: American federalism and intergovernmental relations, state politics, and urban/local politics. Also examines a number of policy issues. Restricted to graduate students or instructor consent required.

**PSCI 7901 (1-3). Topics in Political Science.** Same as PSCI 5901.

**PSCI 8901 (1-3). Graduate Research Project.** Same as PSCI 6901.

**PSCI 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Comparative

**PSCI 2012-3. Introduction to Comparative Politics.** Most countries confront a variety of common political problems, including how to gain popular support, what kinds of political institutions are most appropriate, and how to distribute burdens and benefits to different segments of the population. Concentrates on learning how to compare different political systems and provides illustrative examples from several countries in both the industrialized and nonindustrialized world. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3032-3. Latin American Political Systems.** Stresses different perspectives on Latin American politics and understanding key political actors and processes. Country focus varies. Prereq., PSCI 2012, IAFS 1000, IAFS major, Latin American studies major, or instructor consent. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3042-3. Latin American Economic Development.** Stresses political and economic development in Latin America, as well as interactions with the international economy. Prereq., PSCI 2012, IAFS 1000, or instructor consent. Recommended prereq., PSCI 3032.

**PSCI 3052-3. Women and Politics in Latin America.** Examines ways Latin American women have engaged in politics and their participation in social movements, war, peace processes and elections. Focuses on why women “do politics” in certain ways, the role of the State in women’s politics, the (dis) advantages of various political strategies, and how political, economic and social changes have affected women’s political opportunities and interests. Prereq., WMST 2000 or instructor consent. Recommended prereqs., WMST 2400, 2600, 3600, or 3730. Restricted to juniors/seniors. Same as WMST 3650.

**PSCI 3062-3. Revolution and Political Violence.** Studies and evaluates alternative theoretical frameworks for the analysis of revolution and political violence. Theoretical material is firmly couched in case situations, such as ethnic, class, colonial, urban, racial, and religious conflicts. Prereq., PSCI 1101, 2012, or IAFS 1000.

**PSCI 3072-3. Government and Politics in Southeast Asia.** Surveys historical and contemporary forces shaping politics in Southeast Asia. Gives special attention to comparative political economy, including development strategies and transitions to democracy. Prereqs., PSCI 2012 or IAFS 1000.

**PSCI 3082-3. Political Systems of Sub-Saharan Africa.** Analyzes post-independence and post-Cold War change in sub-Saharan Africa and provides intensive case studies of selected countries exemplifying each type with South Africa seen as a special case. Prereq., PSCI 2012 or IAFS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4002-3. Western European Politics.** Comparatively analyzes development of the political systems and processes of European democracies. Emphasizes contemporary institutions, decision making patterns, and policy issues. Special attention to challenges of welfare systems. Prereq., PSCI 2012 or IAFS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4012-3. Global Development.** Analyzes development theory, case studies in development strategies, and the problems and promises of development: specifically issues of gender, environment, labor, corruption and poverty. The primary focus is on explanations for variation in level of development over time and across countries. Prereq., PSCI 2012, ECON 2020, IAFS 1000, or one upper-division PSCI course. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4022-3. Chinese Foreign Policy.** History of China’s external relations and theories of foreign policy decision making. Explores two vital bilateral relations (Sino-U.S. and Sino-Japanese) and several key issues (like Taiwan) in China’s 21st century foreign policy. Prereq., PSCI 2012.

**PSCI 4052-3. Chinese Politics.** Explores the politics of 20th century China to speculate on China’s future in the 21st century. Begins with an extensive look at the political history of the People’s Republic, before turning to social,

cultural, economic, and political issues today. Concludes with an examination of Chinese foreign policy, with a focus on Sino-American relations. Prereq., PSCI 2012 or IAFS 1000.

**PSCI 4062-3. The Emerging Democracies of Central and Eastern Europe.** Studies developments in the former Soviet satellites and Yugoslavia, their governmental organizations, and their relation to the former Soviet Union and the West. Prereq., PSCI 2012 or IAFS 1000. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4092-3. Comparative Urban Politics.** Comparatively analyzes major urban systems in different political/economic settings and Third-World countries. Gives special attention to political and economic factors shaping urbanization processes and distinctive policy issues in these different settings. Prereqs., PSCI 1101 and 3071 recommended.

**PSCI 4122-3. The Military in Politics: Latin America and the U.S.** Analyzes the causes and consequences of military intervention in politics, contrasting patterns of civil-military relations, and the problem of democratic control of the armed forces. Focuses on the Latin American military, with secondary attention to U.S. military. Prereq., PSCI 2012 or IAFS 1000, and PSCI or ROTC major.

**PSCI 4252-3. Politics of Ethnicity and Nationalism.** Analyzes ethnic identity as a factor in contemporary politics. Deals extensively with the role of ethnic groups in political mobilization, the development of national collective consciousness, nation building, and international relations. Explores the influence of religion, language, history, culture and class on ethnic group formation and behavior. Prereq., PSCI 2012.

**PSCI 4272-3. The Political Economy of Advanced Industrial Democracies.** Considers how political power is used to achieve economic ends and to shape the operations of market economies. Focuses on economic conflicts as political contests, and explores how politics shapes the course of economic development as well as the basis of social and political life. Prereq., PSCI 2012 or IAFS 1000. Recommended prereq., ECON 2020. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4282-3. Legal Systems.** Compares criminal justice systems around the world in order to see how each functions and how each system reflects political and historical traditions, including the civil law tradition that dominates Europe and South America, the common law system that exists in the United States and in most English-speaking countries, and the criminal justice system in Japan. Prereq., PSCI 2012.

**PSCI 4732-3. Critical Thinking in Development.** Exposes students to current issues in the political economy of development. Subjects range from globalization, democratization, and economic development. Specifically, the course explores the international and domestic determinants of economic development with special reference to currency markets, foreign direct investment, trade, and democratization. Prereqs., PSCI 2012 or IAFS 1000, ECON 2010 and 2020, and one upper-division PSCI course. Same as INVS 4302. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 4792-3. Issues in Latin American Politics.** Studies several Latin American countries in some depth including history and contemporary politics. Teaches students to listen to and evaluate different sides of political controversies, and critically evaluate arguments. Prereqs., PSCI 2012 or IAFS 1000, and junior or senior standing.

**PSCI 4842 (1-3). Independent Study in Comparative Politics.** Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 2012 or IAFS 1000.

**PSCI 5902 (1-3). Topics in Political Science.** Not a free option; must be approved by the student’s advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7902.

**PSCI 6902 (1-3). Graduate Research Topic.** Guides independent research on a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student’s advisor and department



chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8902.

**PSCI 6952 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7012-3. Seminar: Comparative Political Systems.** Discusses current literature on comparative politics including theoretical and methodological issues. Restricted to graduate students or instructor consent. required.

**PSCI 7022-3. Seminar in Political and Economic Development.** Covers domestic political and economic development in Latin America, Africa, and Asia, as well as interactions with the global economy. Includes defining, explaining, and prescribing policies for successful development, and comparing the experiences of developing and industrialized countries. Restricted to graduate students or instructor consent required.

**PSCI 7032-3. Seminar: Latin American Politics.** Stresses intensive study of the political process in Latin America with special emphasis on democratization. Restricted to graduate students or instructor consent required.

**PSCI 7062-3. The Politics of Ethnicity.** Explores the political aspects of pluralism, ethnonationalism, separatism, and related phenomena. Examines theories of ethnic mobilization, conflict, and accommodation in the context of political development and nation building. Includes cross-polity comparisons and case studies of multiethnic societies in the developed and developing world. Prereq., at least one course in comparative politics. Restricted to graduate students or instructor consent required.

**PSCI 7082-3. Subordinate Protest and Democratization.** Considers traditional studies of democratic development and democratization. Topics covered include the definition of democracy, characteristics, dilemmas, and limitations; the classical European view of democratization; democratic and nondemocratic characteristics of different social classes; contributions to democracy made by the popular classes; and transitions to democracy and subordinate groups and protest in the democratization process. Restricted to graduate students or instructor consent required.

**PSCI 7092-3. Comparative Human Rights and Repression.** Provides students with an understanding of human rights and repression in a comparative perspective. Deals extensively with conceptual issues, theoretical explanations, and diverse techniques of studying the subject. Restricted to graduate students or instructor consent required.

**PSCI 7112-3. Seminar: Comparative Political Parties and Interest Groups.** Critically examines topics relating to social forces, parties, and interest groups. Analyzes concepts, theories, and case studies with particular emphasis on Western political systems. Also examines party systems in comparison and the role of groups and the determinants of group politics. Restricted to graduate students or instructor consent required.

**PSCI 7132-3. Comparative Political Economy.** Explores the relationship between economics and politics in developed and developing countries. Gives students an historical overview of 20th century economic trends and covers scholarly approaches to topics such as political and economic institutions, economic ideas and interests, the political causes of growth and equality, globalization and the welfare state, and varieties of capitalism. Recommended prereq., PSCI 7012. Restricted to graduate students.

**PSCI 7142-3. The Political Economy of the Democratic Welfare State.** Advanced seminar that examines the structure of political and economic relations in several advanced democracies. Specifically examines a series of historical, institutional, and cultural theories that purport to explain these differences. Restricted to graduate students or instructor consent required.

**PSCI 7152-3. Seminar in Chinese Politics.** A comprehensive introduction to the study of Chinese politics is provided. It begins with China's revolutionary heritage, before turning to state-society relations in China today. Concludes with China's external relations. Will China be a status quo or a revisionist power in the 21st century? Restricted to graduate students or instructor consent required.

**PSCI 7902 (1-3). Topics in Political Science.** Same as PSCI 5902.

**PSCI 8902 (1-3). Graduate Research Topic.** Same as PSCI 6902.

**PSCI 8992 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements

for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## International Relations

**PSCI 2223-3. Introduction to International Relations.** Introduces the field of international relations, with general survey of the theories, histories, and problems of historical and contemporary relations among state and nonstate actors. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3123-3. War, Peace, and Strategic Defense.** Analyzes employment, or the threat of employing force, in securing American interests in the post-Cold War world. Gives special attention to utilities claimed for nuclear weapons, and alternatively, to weapons control and disarmament. Prereq., PSCI 2223.

**PSCI 3143-3. Problems in International Relations.** Analyzes the various theoretical and policy challenges facing the post-Cold War world, with an emphasis on examining alternative conceptions of and approaches to such challenges. Prereq., PSCI 2223. Approved for arts and sciences core curriculum: contemporary societies.

**PSCI 3163-3. American Foreign Policy.** Examines foundations, assumptions, objectives, dynamics, and methods of U.S. foreign policy since WWII. Gives special attention to domestic and external problems of adapting U.S. policy to the changing world environment. Prereq., PSCI 2223. Approved for arts and sciences core curriculum: United States context.

**PSCI 3193-3. International Behavior.** Presents alternate theoretical frameworks for the explanation of international processes. Applies theories of conflict behavior and social organization to problems of war and peace. Prereq., PSCI 2223.

**PSCI 4173-3. International Organization.** Analyzes international organizations to determine whether they are an effective instrument for achieving peace and security and for the promotion of human welfare. Prereq., PSCI 2223.

**PSCI 4183-3. International Law.** Investigates the body of law that regulates relations between nation states and provides a framework for the solving of common problems. Explores its nature and effectiveness as well as its adaptability to a changing environment. Prereq., PSCI 2223.

**PSCI 4193-3. International Political Economy.** Analyzes issues at the intersection of international politics and international economics. Utilizes theories and concepts from both economics and political science to understand issues in trade, finance, development and migration. Prereq., PSCI 2223. Recommended prereq., ECON 1000.

**PSCI 4213-3. Europe in the International System.** Covers European and Atlantic regionalism. Discusses such communities as the Council of Europe, NATO, EFTA, and OECD, and provides a detailed examination of the European Union. Looks at theories of integration, problems of partnership and interdependence, rival nationalisms and strategic doctrines, and problems of the post-Cold War era. Prereq., PSCI 2223.

**PSCI 4703-3. Alternative World Futures.** Aims to help students think about the future of the world in a systematic way. Focuses on alternative projections and policies dealing with major problems. Prereq., PSCI 2223 and junior or senior standing.

**PSCI 4783-3. Global Issues.** Studies the principal issues confronting humanity that affect stability and survivability and their economic, social, and political implications. Prereq., PSCI 2012 or 2223. Restricted to seniors.

**PSCI 4843 (1-3). Independent Study in International Relations.** Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 2223.

**PSCI 5903 (1-3). Topics in Political Science.** Not a free option; must be approved by the student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7903.

**PSCI 6903 (1-3). Graduate Research Topic.** Independent research in a topic of special interest. Arrangements made to suit needs of each student. Not a free

option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8903.

**PSCI 6953-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7013-3. Seminar: International Relations.** Reviews salient literature on international relations, and subsequent presentation and critical discussion of analytical studies. Allows students wide latitude in substantive and methodological approaches. Emphasizes changing trends and efforts to understand the bases for cooperation and conflict. Restricted to graduate students or instructor consent required.

**PSCI 7023-1. Foreign Policy.** Examines sources of foreign policy in terms of international pressures, economic interests, bureaucratic politics, cognitive process, public opinion, elections, congress, and presidential leadership. Examines uses and limitations of economic statecraft, military intervention, and current foreign policy issues. Recommended prereq., PSCI 7013.

**PSCI 7043-3. Seminar: Problems of International Organization.** Studies selected problems concerning administration and operation of public international organizations, including the United Nations and its specialized agencies. Considers decision making, executive leadership, internal organization, personnel policies, coordination of activities, and financing. Restricted to graduate students or instructor consent required.

**PSCI 7053-3. War and Peace.** Provides systematic treatment of theories, concepts, and data addressing the conditions and processes of international conflict, violence, and stability, with attention to historical and contemporary cases. Restricted to graduate students or instructor consent required.

**PSCI 7073-3. Seminar: Global Political Economy.** Introduces graduate students to concepts, theories, and data used to study the global system from a political-economic framework. Examines world systems analysis, regime change theory, and dependency theory with respect to operation of the exchange and power relationship within the contemporary world system. Restricted to graduate students or instructor consent required.

**PSCI 7113-3. Advanced Readings in International Relations.** Provides an advanced readings course for international relations graduate students. Acts as a capstone course for those preparing to take the PhD comprehensive exams, and is intended to provide in-depth knowledge about core areas of international relations scholarship. Prereq., PSCI 7013. Restricted to graduate students or instructor consent required.

**PSCI 7123-3. Seminar: Conflict Behavior—The Politics of Violence.** Surveys historical, theoretical, and empirical analyses of violent conflict behavior, including causes and consequences of riots, terrorism, revolution, international war, and intervention. Restricted to graduate students or instructor consent required.

**PSCI 7333-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as GEOG 5332, SOCY 6031, and ECON 8333.

**PSCI 7903 (1-3). Topics in Political Science.** Same as PSCI 5903.

**PSCI 8903 (1-3). Graduate Research Topic.** Same as PSCI 6903.

**PSCI 8993 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Political Theory

**PSCI 2004-3. Survey of Western Political Thought.** Studies main political philosophies and political issues of Western culture, from antiquity to 20th century. Approved for arts and sciences core curriculum: ideals and values.

**PSCI 3054-3. American Political Thought.** Highlights the development of American political theories and ideas from colonial period to present. Can also be taken for American field credit. Recommended prereq., PSCI 2004. Approved for arts and sciences core curriculum: United States context or ideals and values.

**PSCI 3064-3. Environmental Political Theory.** Examines environmental discourses as conceptual means for theorizing environmental politics, and applies normative political theories to contemporary environmental policy issues. Considers the roles of political actors (individuals, groups, the state) in defining and addressing environmental problems on local, national, and global levels. Recommended prereq., PSCI 2004. Approved for arts and sciences core curriculum: ideals and values.

**PSCI 4024-3. Senior Seminar in Political Theory.** Intensively analyzes and discusses major theories and issues of both contemporary political thought and the history of political philosophy. The topic is announced by the instructor, but might include analysis of concepts (justice, human rights, democracy, etc.) or major theories. Emphasizes advanced discussion plus individual research. Prereq., PSCI 2004.

**PSCI 4704-3. Politics and Language.** Explores the use of language in politics. Examines in depth the political nature and meaning of language, including its significance, philosophy, and practice. Prereq., PSCI 2004. Restricted to junior/seniors.

**PSCI 4714-3. Liberalism and Its Critics.** Examines contemporary arguments for and against liberalism. Focuses on the analysis, evaluation, and understanding of the philosophical contributions to this debate. Gives special attention to the concepts of justice, freedom, equality, and individualism. Prereq., PSCI 2004. Restricted to juniors and seniors.

**PSCI 4734-3. Politics and Literature.** Broadly examines political topics as they are presented in important literary works and analyzes the possibilities involved in using the literary mode to present political teachings. Prereq., PSCI 2004. Restricted to juniors and seniors.

**PSCI 4774-3. Liberal Democracy and the First Amendment.** Examines in depth various philosophical and legal justifications of First Amendment rights of speech, press, association, and religion. Assesses these justifications in relation to broader normative theories of liberal democracy. Prereq., PSCI 2004. Recommended prereq., PSCI 2481. Restricted to juniors/seniors.

**PSCI 4844 (1-3). Independent Study in Political Theory.** Subjects and arrangements suit individual student needs. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall GPA of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours. Prereq., PSCI 2004.

**PSCI 5904 (1-3). Topics in Political Science.** Not a free option; must be approved by the student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours.

**PSCI 6904 (1-3). Graduate Research Topic.** Independent research in a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8904.

**PSCI 6954-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7004-3. Seminar: Political Theory.** Allows for intensive research in and presentation of selected topics. Introduces students to the broad context within which political ideas arise. Deals with classical and modern thought. Restricted to graduate students or instructor consent required.

**PSCI 7024-3. Seminar: Selected Political Theories.** Familiarizes students with selected political philosophies or theories in classical or modern political thought. Restricted to graduate students or instructor consent required.

**PSCI 8904 (1-3). Graduate Research Topic.** Same as PSCI 6904.

**PSCI 8994 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Empirical Theory and Research Methodology

**PSCI 2075-3. Quantitative Research Methods.** Introduces quantitative research methods used in political science. Focuses on basic tools of analysis: data collection, processing, and evaluation, with special attention to survey techniques. Includes elite and case study analysis; aggregate, cluster, and content analysis; and the use of computers in political research. Prereq., PSCI 1101, 2223, or 2012 (formerly PSCI 2074). Approved for arts and sciences core curriculum: quantitative reasoning and mathematical skills.

**PSCI 3105-3. Designing Social Inquiry: An Introduction to Analyzing Political Phenomena.** This course is designed to survey the wide range of research designs and methods employed in political science research, including normative analysis, interpretive analysis and causal analysis. It will provide an introduction to students planning to write honors theses and will be useful for any student planning to do research in political sciences as part of a senior seminar or capstone course. Approved for arts and sciences core curriculum: quantitative reasoning and mathematics.

**PSCI 3225-3. Rationality, Democracy, and Public Policy.** Focuses on the rational choice approach to understanding social decision making. Examines possibilities for choosing rational courses of social action and concrete problems of rational decision making. Prereqs., PSCI 1101 or 2012. Restricted to sophomores/juniors/seniors.

**PSCI 5905 (1-3). Topics in Political Science.** Not a free option; must be approved by the student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7905.

**PSCI 6905 (1-3). Graduate Research Topic.** Offers the opportunity for independent research in a topic of special interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8905.

**PSCI 6955-4. Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7075-3. Introduction to Professional Political Science.** Introduces graduate students to intellectual foundations and historical development of political science; epistemologies, subfields, intellectual approaches, methodological strategies of the discipline; and ethics and norms of professional conduct. Restricted to graduate students or instructor consent required.

**PSCI 7085-4. Introduction to Political Science Data Analysis.** Provides intensive experience with quantitative techniques commonly employed in political science research; builds on a review of multivariate regression, inferential statistics, and causal modeling. Students undertake substantive research projects, requiring lab instruction in the use of the computer in quantitative applications of political science research. Prereq., graduate standing.

**PSCI 7095-3. Advanced Political Data Analysis.** Provides advanced training in empirical and analytic methods of political analysis. Covers general multivariate linear (regression) model as employed in political science. Also covers a variety of dynamic approaches to empirical analysis (stochastic models, time series, and simulation). Restricted to graduate students. Prereq., instructor consent.

**PSCI 7145-3. Basic Formal Methods in Political Science.** Introduces the application and role of models in political science (domestic and international politics), in areas such as voting, committees, power, decision making, and war and peace. Models include applications of set theory, elementary probability, games, and systems analysis. Restricted to graduate students or instructor consent required.

**PSCI 7905 (1-3). Topics in Political Science.** Same as PSCI 5905.

**PSCI 8905 (1-3). Graduate Research Topic.** Same as PSCI 6905.

**PSCI 8995 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Public Policy

**PSCI 2106-3. Introduction to Public Policy Analysis.** Studies policymaking processes in American government, factors shaping public decision, and issues and questions relevant to political inquiry.

**PSCI 3206-3. The Environment and Public Policy.** Considers constitutional, political, and geographic factors in development of public policy affecting the use of natural resources and management of the environment; organization, procedures, and programs for use of natural resources; and administration of environmental policies. Prereq., PSCI 1101. Restricted to sophomores/juniors/seniors.

**PSCI 4716-3. Selected Policy Problems.** Integrates general principles of policy inquiry with documents and other literature on specific problems in public policy, in order to evaluate courses of action. May be repeated up to 6 total credit hours on different topics. Prereq., PSCI 1101. Restricted to juniors and seniors.

**PSCI 5906 (1-3). Topics in Political Science.** Not a free option; must be approved by the student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 7906.

**PSCI 6906 (1-3). Graduate Research Topic.** Provides the opportunity for independent research in topic of interest. Arrangements made to suit needs of each student. Not a free option; must be approved by student's advisor and department chair. Does not count as a seminar. May be repeated up to 7 total credit hours. Same as PSCI 8906.

**PSCI 6956 (1-4). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSCI 7016-3. Introduction to the Policy Sciences.** Provides an introduction to the policy sciences as a distinctive tradition within the policy field. Emphasizes the use of conceptual tools to improve analysis of complex problems. Teaches problem solving framework that students apply to an issue of their choice. Restricted to graduate students or instructor consent required. Same as ENV5 5710.

**PSCI 7026-3. The Problem Orientation.** Teaches basic problem solving framework for policy analysis. Emphasizes applications to develop policy recommendations for issues selected by students. Includes group projects. Restricted to graduate students or instructor consent required. Same as ENV5 5720.

**PSCI 7036-3. Introduction to the Policy Sciences: The Decision Process.** Provides policy sciences frameworks for analyzing policy processes and designing political strategies to influence those processes in the direction of the preferred alternative. Emphasizes applications to problems selected by students for term projects. Restricted to graduate students or instructor consent required. Same as ENV5 5730.

**PSCI 7046-3. Seminar: Urban Public Policy.** Focuses on formulation, revision, and outcomes of public policy in American urban communities. Also uses some comparative Canadian and European literature. Restricted to graduate students or instructor consent required.

**PSCI 7056-3. Readings in Public Policy.** Explores diverse approaches to policy choice, change, and learning processes. Overviews literature on policy determinants and typologies, policy subsystems, innovation and diffusion, agenda setting, implementation, problem definition and social construction, policy design, institutional analysis, and policy and democratic values. Restricted to graduate students or instructor consent required.

**PSCI 7116-3. Context-Sensitive Research Methods.** Prepares students to conduct research on topics where data is not obvious or not easily available. Encompasses variations in context and setting as part of data observations. Methods include interviewing protocols, interpretive methods, cluster analyses, case study methodologies, and textual analyses. Restricted to graduate students or instructor consent required. Same as ENV5 5740.

**PSCI 7906 (1-3). Topics in Political Science.** Same as PSCI 5906.

**PSCI 8906 (1-3). Graduate Research Topic.** Same as PSCI 6906.

**PSCI 8996 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## General

**PSCI 2028-3. Special Topics.** Offers subjects not covered by existing courses. Offered when department approves a special topic. May be repeated up to 12 total credit hours for different topics.

**PSCI 4008-3. Political Science Honors Thesis.** Involves writing an honors thesis. Prereq., PSCI 4718.

**PSCI 4028-3. Special Topics.** Offers subjects not covered by existing courses. Offered when the department approves a special topic. May be repeated up to 12 total credit hours for different topics.

**PSCI 4718-3. Honors Political Science Seminar.** Involves writing and discussion of selected topics in political science. Critically reviews the major methodological and conceptual features of the discipline. Students begin their honors papers in the seminar. Prereq., GPA of at least 3.50. Generally offered in fall term only. Approved for arts and sciences core curriculum: critical thinking.

**PSCI 4848 (1-3). Independent Study.** Subjects chosen and arrangements made to suit needs of each student. Independent study is for upper-division students who have completed 9 credit hours of political science and who have an overall average of at least 3.00. Not more than 6 credit hours of independent study may be credited toward the minimum requirements in the political science major. Special independent study approval agreement form must be obtained from the department. May be repeated up to 7 total credit hours.

**PSCI 4938-6. Internship in Government.** With instructor's assistance, students secure an internship with a political or governmental organization. In addition to the internship, the class consists of regular seminars, course readings and assignments, and individual conferences with the instructor. Student pursues an academic research project and writes an original research paper. Instructor approval required in semester preceding internship. Contact instructor prior to early registration. Prereq., PSCI 1101.

**PSCI 6908 (1-3). Graduate Research Topic.** Same as PSCI 8908.

**PSCI 6948 (1-3). Master's Degree Candidate.**

**PSCI 6998-3. Master's Degree Candidate.**

**PSCI 7008-1. Teaching Political Science 1.** First of two courses designed to prepare graduate teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline-specific education. Restricted to graduate students or instructor consent required.

**PSCI 7028-1. Teaching Political Science 2.** Second course designed to train graduate teachers in the essentials of political science teaching and provide a background in theories of political science teaching and practical skills development in discipline specific education. Prereqs., PSCI 7008 and completion of comprehensive examinations.

**PSCI 7108 (1-3). Special Topics.** Various topics not normally offered in the curriculum. Topics vary each semester. May be repeated up to 9 total credit hours.

**PSCI 7908 (1-3). Topics in Political Science.**

**PSCI 8908 (1-3). Graduate Research Topic.** Same as PSCI 6908.

## Psychology

**PSYC 2700-3. Psychology of Contemporary American Women.** Surveys psychological theory and research concerning contemporary American women. Deals with such issues as masculine bias in American culture, sex difference in cognitive functioning and personality, psychological conflict for women between career and home, and specific areas pertaining to women's mental health. Prereq., PSYC 1001 or WMST 2000. Same as WMST 2700. Approved for arts and sciences core curriculum: human diversity.

**PSYC 4220-3. Language and Mind.** Studies processes of perceiving speech, interpreting it as meaningful, and expressing intentions to communicate as utterances. Emphasizes roles of the brain and of perceptual and motor systems. Writing, gestural, and animal communicative systems also are treated. Prereqs., PSYC 1001 and LING 2000. Same as LING 4220.

**PSYC 4560-3. Language Development.** Examines the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives. Prereqs. or coreqs., PSYC 1001 and LING 2000. Same as LING 4560 and SLHS 4560.

**PSYC 4700-3. Women and Mental Health.** Examines mental health issues of women by focusing on theories of female personality development. Explores theory and research pertaining to women and psychopathology and to women as patients in traditional and nontraditional forms of treatment. Prereq., PSYC 2700, WMST 2000, or WMST 2700. Same as WMST 4700.

**PSYC 4740-3. Biology of Amphibians and Reptiles.** Focuses on comparative morphology, taxonomy, ecology, behavior, and geographic distribution of amphibians and reptiles. Prereqs., EBIO 1210, 1220, 1230, and 1240; or PSYC 1001, 2012. Same as PSYC 5740 and EBIO 4740.

**PSYC 5200-3. Physiological Genetics and Genomics.** Introduces genetic and genomic concepts as they apply to mammalian physiology. The course covers fundamental concepts and methods in molecular genetics and genomics and their applications towards understanding the role of genetics in the normal and pathological function of physiological systems. Same as IPHY 5200.

**PSYC 5300-3. Research in Psycholinguistics.** After a general introduction to issues and research methods in psycholinguistics (language production and comprehension, language and cognition, language acquisition), several major current research topics, such as models of speech production, and theories of brain specialization for language, are explored. Prereq., instructor consent. Same as LING 5300.

**PSYC 5740-3. Biology of Amphibians and Reptiles.** Same as PSYC 4740, EBIO 5740.

**PSYC 6200-3. Issues and Methods in Cognitive Science.** Same as CSCI 6402, EDUC 6504, LING 6200, PHIL 6310.

## General

*Many of the following courses have controlled enrollment by application. Please check with the department office in Muenzinger D243 for further information.*

**PSYC 1001 (3-4). General Psychology.** Three hours lec. and one hour rec. per week. Surveys major topics in psychology: perceptions, development, personality, learning and memory, and biological bases of behavior. Students may participate as subjects for several hours in ongoing research. Meets MAPS requirement for social science: general.

**PSYC 2841 (1-3). Independent Study (Lower Division).** May be repeated up to 6 total credit hours. Pass/fail only. Prereq., freshman or sophomore standing. Restricted to psychology majors.

**PSYC 3001-4. Honors Research Methods Seminar.** Focuses on research design. Each student prepares an original, detailed research proposal, which can become the honors thesis. Open only to students who have been accepted into the psychology departmental honors program. Prereq., instructor consent.

**PSYC 3101-4. Statistics and Research Methods in Psychology.** Three hours of lecture and one two-hour lab per week. Introduces descriptive and inferential statistics and their roles in psychological research. Topics include correlation, regression, t-test, analysis of variance, and selected nonparametric statistics. Prereq., MATH 1011 or equivalent.

**PSYC 4001-3. Honors Seminar 2.** Surveys contemporary issues, explores current controversies, and examines in detail selected topics in psychology. Open to juniors and seniors in the department's honors program. Prereq., instructor consent.

**PSYC 4011 (1-6). Senior Thesis.** Critically reviews some aspect of psychological literature, scholarly analysis of a major psychological issue, and/or empirical research project. See the psychology honors director for further information. May be repeated up to 6 total credit hours.

**PSYC 4511-3. History of Psychology.** Includes outline of development of psychological theories since the Greek philosophers, the story of experimental psychology and its problems, and schools of psychological thinking. Students read original sources in English and English translations. Restricted to juniors and seniors.

**PSYC 4521-3. Critical Thinking in Psychology.** Allows students to expand their powers as they think about psychological problems, or about how psychological knowledge and techniques can be applied to pressing political, economic, biological, quantitative, and social issues. Encourages intellectual discipline and critical thinking about concepts and ideas; enables students to participate in oral and written discussion. Restricted to psychology seniors. May not be repeated, only 3 credit hours allowed.

**PSYC 4541 (1-6). Special Topics in Psychology.** Studies and analyzes special interest topics from the broad and diversified field of psychology. Particular section content is determined by instructor. May be repeated up to 6 total credit hours, provided the topics vary. Restricted to juniors and seniors. Same as PSYC 5541.

**PSYC 4841 (1-6). Independent Study (Upper Division).** Pass/fail only. May be repeated up to 8 total credit hours. Prereq., junior or senior standing. Restricted to psychology majors.

**PSYC 4911-3. Teaching of Psychology.** Students receive concrete experience in teaching general psychology under supervision of a psychology faculty member. Alternative pedagogical strategies are discussed. Students must submit an application to the undergraduate advising center.

**PSYC 4931-3. Field Placement Internship.** Offers valuable volunteer experience through a supervised field placement. Provides hands-on insight into the decisions and issues that confront professionals in psychology and related fields. Prereqs., completion of 15 or more hours of psychology course work. Restricted to psychology majors.

**PSYC 5541 (1-6). Special Topics in Psychology.** Same as PSYC 4541.

**PSYC 5741-4. General Statistics.** Surveys probability and statistics in psychology. Instructor consent required.

**PSYC 5751-4. General Statistics.** Continuation of PSYC 5741. Instructor consent required.

**PSYC 6841 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**PSYC 6911 (1-3). Research Practicum.**

**PSYC 6941-3. Master's Degree Candidate.** May be repeated up to 7 total credit hours.

**PSYC 6951 (1-6). Master's Thesis.** May be repeated up to 7 total credit hours.

**PSYC 7291-3. Multivariate Analysis.** Familiarizes students with scientific concepts, matrix theory, and computer techniques of multivariate analyses for psychological research. Topics include cluster and factor analysis, multiple regression, and discriminant functions. Emphasizes research technology rather than mathematical theory. Instructor consent required.

**PSYC 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Biological

**PSYC 2012-3. Biological Psychology 1.** Surveys biological bases of learning, motivation, emotion, sensory processes and perception, movement, comparative animal behavior, sexual and reproductive activity, instinctual behavior, neurobiology of language and thought, and neurophysiology and neuroanatomy in relation to behavior. Prereq., PSYC 1001. Approved for arts and sciences core curriculum: natural science.

**PSYC 2022-3. Biological Psychology 2.** Continuation of PSYC 2012. Integrates knowledge and facts presented in PSYC 2012 into current topics in biopsychology. Course no longer taught after fall 2003, except through Continuing Education correspondence. Prereq., PSYC 2012.

**PSYC 3102-3. Behavioral Genetics.** Inheritance of behavioral characteristics. Prereq., PSYC 3101.

**PSYC 4032-3. Neurobiology of Learning and Memory.** Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of

different types, and (c) the synaptic mechanisms that are involved. Prereqs., PSYC 2012, or 4052, or IPHY 3730, or instructor consent. Restricted to juniors and seniors. Same as PSYC 5032.

**PSYC 4052-4. Behavioral Neuroscience.** Intensive survey of the morphological, neurochemical, and physiological aspects of behavior. Prereqs., PSYC 2012-2022 or EBIO 1210-1220, or CHEM 1111-1131, or PHYS 1010-1020, or PHYS 2010-2020. Same as PSYC 5052.

**PSYC 4072-3. Clinical Neuroscience: A Clinical and Pathological Perspective.** Provides basic science background for understanding the mechanism of behavioral disturbances resulting from brain damage. Emphasizes pathological neuroanatomy, neurophysiology, and neuropharmacology, which is essential for understanding problems related to health and disease. Prereqs., PSYC 2012 and one of the following sequences of courses: EBIO 1210 and 1220, MCDB 1150 and 2150, or MCDB 1150 and EBIO 1220. Same as PSYC 5072.

**PSYC 4092-3. Hormones and Behavior.** Represents application of endocrinological concepts and techniques to problems of motivation and behavior. Prereqs., junior or senior standing. Same as PSYC 5092.

**PSYC 4112-3. Behavioral Genetics Laboratory.** Provides laboratory experience in behavioral genetics. Students train in one or more aspects of data collection and interpretation, read research papers, contribute nine hours per week to a research project in behavioral genetics, and write a report. Prereq., PSYC 3102 or 4102.

**PSYC 4132-3. Behavioral Neuropharmacology.** Advanced course in neuroscience, considering chemical transmission in detail. Topics include endocrinology as well as the mechanism of action of psychoactive drugs, cellular neurochemistry, and special topics in neuroscience research. Explains how psychologists use drugs to study learning, attention, motivation, and abnormal behavior. Prereq., PSYC 4052 or 5052. Same as PSYC 5132.

**PSYC 5032-3. Neurobiology of Learning and Memory.** Same as PSYC 4032.

**PSYC 5052-4. Behavioral Neuroscience.** Same as PSYC 4052.

**PSYC 5072-3. Clinical Neuroscience.** Same as PSYC 4072.

**PSYC 5082 (2-3). Seminar: Biological Psychology.** Special topics concerning biological bases of behavior. Prereqs., PSYC 4052 and instructor consent.

**PSYC 5092-4. Hormones and Behavior.** Same as PSYC 4092.

**PSYC 5102-2. Behavioral Genetics.** Instructor consent required.

**PSYC 5112-3. Concepts in Behavioral Genetics.** Examines selected topics in greater detail than is possible in the comprehensive undergraduate course in behavioral genetics (PSYC 3102). Topics covered may include inheritance of behavioral characteristics from perspectives of pharmacogenetics, transmission genetics, biochemical genetics, and evolutionary genetics. May be repeated up to 9 total credit hours. Instructor consent required.

**PSYC 5122-3. Quantitative Genetics.** Surveys principles of genetics of quantitative characteristics. Topics include gene frequencies, effects of mutation, migration, and selection. Also looks at correlations among relatives, heritability, inbreeding, crossbreeding, and selective breeding.

**PSYC 5132-3. Behavioral Neuropharmacology.** May be repeated up to 6 total credit hours. Same as PSYC 4132.

**PSYC 5232-3. Molecular Genetics and Behavior.** Covers fundamental mechanisms of gene action, including DNA structure and regulation of gene expression. Discusses molecular techniques used to examine human genetic diseases. Emphasizes genetic diseases with behavioral and neurological abnormalities. Prereq., PSYC 5102 or instructor consent. Same as IPHY 5232.

**PSYC 5242-3. Biometrical Methods in Behavioral Genetics.** Studies development of structural models appropriate to behavioral genetics and the estimation procedures necessary for their application. Instructor consent required.

**PSYC 5262-3. Mammalian Neuroanatomy.** Covers microscopic anatomy and function of different brain regions. Emphasizes correlation between structure and function, particularly at cellular and synaptic level. Course includes brain dissection, description of neuroanatomical and neurohistological techniques, and an introduction to the ultrastructure of neurons. Prereqs., PSYC 4052 or MCDB 4190, and instructor consent.

**PSYC 7012 (1-3). Research in Behavioral Genetics.** Individual research projects. May be repeated up to 7 total credit hours.

**PSYC 7102-2. Seminar: Behavioral Genetics.** Intensive study of selected topics in behavioral genetics. Emphasizes recent research. Attention to both human and animal studies. May be repeated up to 8 total credit hours. Prereq., instructor consent.

## Clinical

**PSYC 2303-3. Psychology of Adjustment.** Surveys concepts bearing upon processes of normal psychological adjustment, with emphasis on using the concepts to understand common human problems in personal growth and relationships with others.

**PSYC 2643-3. Child and Adolescent Psychology.** Surveys major psychological processes of childhood and adolescence. Prereq., PSYC 1001.

**PSYC 3313-4. Psychopathology.** Three hours lec. and two hours rec. per week. Analyzes major theories of personality and behavioral disorders. Restricted to junior and senior PSYC majors. Prereq. PSYC 1001 or instructor consent. Credit not granted for this course and PSYC 4303.

**PSYC 4303-3. Abnormal Psychology.** Examines borderline disorders as extreme variations of the normal personality. Focuses on major functional and organic disorders, theories of mental disorders, and methods of psychotherapy. Prereq., PSYC 1001. Credit not granted for this course and PSYC 3313.

**PSYC 4443-4. Research Methods in Clinical Psychology.** Learn to evaluate research methods as they relate to etiology, assessment, and intervention of psychological disorders. Emphasizes the importance of using sound methodological strategies in both research and clinical settings. Three lectures, one lab per week. Prereqs., PSYC 1001, 3101, and 3313 or 4303.

**PSYC 4713-3. Survey of Clinical Psychology.** Covers theories and practices relating to problems of ability and maladjustment. Diagnostic procedures and treatment methods with children and adults. Prereq., PSYC 3313 or 4303. Open to majors only.

**PSYC 4733-4. Psychological Testing and Assessment.** Provides an overview of issues central to testing and assessment of psychological constructs, including types of evaluation instruments currently in use in the field, their applications, and design. Prereqs., PSYC 1001 and 3101.

**PSYC 5423-3. Research Problems in Clinical Psychology.** Examines research issues relevant to the field of clinical psychology and mental health for the purpose of developing familiarity with substantive and methodological problems facing the field. Prereq., instructor consent.

**PSYC 5433-3. Adult Psychopathology.** Intensively surveys major theories, research findings, and behavioral characteristics associated with deviant reaction patterns. Prereq., instructor consent.

**PSYC 5453-3. Developmental Psychopathology.** Prereq., instructor consent. Restricted to graduate psychology majors.

**PSYC 7663-1. Intellectual Assessment Laboratory.** Practice administration of common intellectual tests. Prereq., instructor consent. Coreq., PSYC 7683. Restricted to clinical psychology graduate students.

**PSYC 7673-3. Adult Psychotherapy.** Discusses selected topics in the field of psychotherapy, including content consideration and pertinent research. Topics vary from semester to semester. Prereq., instructor consent.

**PSYC 7683 (1-3). Intellectual Assessment, with Practicum, in Clinical Psychology.** Focuses on administering and interpreting objective test results commonly used in clinical psychology practice. Probable inventories used are MMPI, SCII, WISC, WAIS, plus other objective measures where relevant. Includes case study approach and direct clinical experience. May be repeated up to 8 total credit hours. Prereq., instructor consent.

**PSYC 7693-3. Personality Measurement.** Covers theory and practice primarily in areas of individual personality testing. Involves intensive field work and report writing. Prereq., instructor consent.

**PSYC 7703-3. Seminar: Clinical Psychology.** Offers selected topics in the area of clinical psychology. May be repeated up to 12 total credit hours. Prereq., instructor consent.

**PSYC 7713 (1-3). Practicum in Clinical Psychology.** Provides direct clinical experience for PhD candidates in clinical psychology only. May be repeated up to 18 total credit hours.

**PSYC 7773-3. Professional Issues and Ethics in Prevention and Intervention.** Focuses on ideographic study of attitudes, values, and personality characteristics of individuals using data obtained from personal interviews. Covers theory and practice of various interviewing approaches. Open to PhD candidates in clinical psychology only.

## Developmental

**PSYC 4114-3. Educational Psychology and Adolescent Development.** Examines the principles of educational and adolescent psychology and development that play a significant role in analyzing and understanding the complex processes in middle and secondary school classrooms. Course has both theoretical and practical dimensions. Same as EDUC 4112.

**PSYC 4684-3. Developmental Psychology.** In-depth consideration of human developmental processes across the life span. Includes coverage of the major topics in human development, such as physical, cognitive, social, and personality development. Prereq., PSYC 1001. Restricted to juniors and seniors.

## Experimental

**PSYC 2145-3. Introductory Cognitive Psychology.** Introduces the study of cognitive processes of human beings: sensation, perception, attention, pattern recognition, memory, learning, language, visual thought, reasoning, problem solving, and decision making. Discusses applications to education, human factors, human computer interaction, law, and other areas of psychology. Prereq., PSYC 1001.

**PSYC 3005-3. Cognitive Science.** Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving and judgment. Emphasizes the nature, implications, and limitations of the computational model of mind. Prereqs., two of the following: PSYC 2145, LING 2000, CSCI 1300, and PHIL 2440. Same as LING 3005, PHIL 3310, and CSCI 3702.

**PSYC 3105-3. Experimental Methods in Psychology.** Provides an introduction to the use of experimental procedures in psychology. Students learn about the logic and design of experiments, the meaning of psychological data, how to analyze and interpret data, and the role of theory in psychology. Prereqs., PSYC 1001 and 3101. Recommended prereq., PSYC 2145.

**PSYC 4145-4. Advanced Cognitive Psychology.** Advanced course in human cognitive processes. Focuses on attention pattern recognition. Memory, learning, language, visual thought, reasoning, problem solving, and decision making. Discusses major theories and ideas in terms of the research they have inspired. Emphasis varies with instructor. One lab per week; research project required. Prereqs., PSYC 1001, 2145, and 3101. Same as PSYC 5145.

**PSYC 4155-4. Cognitive Neuroscience/Neuropsychology.** An introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: motor control, object recognition, spatial processing, attention, language, memory and emotion. One lab, three lectures per week. Prereqs., PSYC 1001, 2012, 2145, and 3101.

**PSYC 4165-4. Psychology of Perception.** One lab, three lect. per week. Analyzes peripheral and central mechanisms involved in the transduction and interpretation of experience. Gives special attention to vision and audition; major theories in these areas are discussed in terms of research they have inspired. Prereqs., PSYC 1001 and 3101.

**PSYC 4175-4. Computational Cognitive Neuroscience.** Introduction to cognitive neuroscience (how the brain gives rise to thought) using computer simulations based on the neural networks of the brain. Covers a full range of cognitive phenomena including perception and attention, learning and memory, language, and higher-level cognition based on both large-scale cortical neuroanatomy and detailed properties of cortical neural networks. One lab per week. Recommended only for students with a strong interest in the topic, as

it requires a combination of computer modeling, neuroscience and cognition. Prereq., PSYC 1001, 2012, 2145, and 3101. Same as PSYC 5175.

**PSYC 4385-3. Ethology and Comparative Psychology.** Discusses behavior of representative members of each animal phylum. Emphasizes ontogeny of behavior as well as phylogeny. Prereq., PSYC 1001 or EBIO 1210. Same as PSYC 5385.

**PSYC 5145-4. Advanced Cognitive Psychology.** Instructor consent required. Same as PSYC 4145.

**PSYC 5175-4. Computational Cognitive Neuroscience.** Instructor consent required. Same as PSYC 4175.

**PSYC 5385-3. Ethology and Comparative Psychology.** Prereq., instructor consent. Same as PSYC 4385.

**PSYC 5665-2. Proseminar: Advanced Experimental Psychology.** Provides an advanced and intensive survey to topics in experimental psychology. General areas are higher-level cognition, attention, and learning and memory. Meets seven weeks in the term. May be repeated up to 4 total credit hours. Prereq., instructor consent.

**PSYC 5685-2. Proseminar: Advanced Experimental Psychology.** Provides an advanced and intensive survey of topics in experimental psychology. General areas are research methods in cognitive psychology, and low-level perception. Meets seven weeks in the term. May be repeated up to 4 total credit hours. Prereq., instructor consent.

**PSYC 5815-2. Proseminar: Advanced Experimental Psychology.** Provides an advanced and intensive survey of topics in experimental psychology. General areas are language and high-level thinking. Meets seven weeks in the term. May be repeated up to 4 total credit hours. Prereq., instructor consent.

**PSYC 7215-3. Seminar: Experimental Psychology.** Advanced seminar dealing with different specialized topics, at the discretion of the instructor, in different years. Topics chosen are within the broad range of experimental psychology. Instructor consent required.

**PSYC 7315-2. Advanced Research Seminar on Human Memory.** Addresses topics in the experimental psychology of human memory. Content varies from semester to semester, depending on interests of faculty and students. A sample topic is the long-term retention of skills. Prereq., graduate standing in psychology or related disciplines.

**PSYC 7415-2. Cognitive Science Research Practicum.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as LING 7415, CSCI 7412, and EDUC 6506.

**PSYC 7425-2. Cognitive Science Research Practicum 2.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., LING 7415 or PSCY 7415 or CSCI 7412 or EDUC 6506. Same as LING 7425, CSCI 7422, and EDUC 6516.

**PSYC 7765 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as CSCI 7762, EDUC 6505, and LING 7762.

**PSYC 7775(1-2). Topics in Cognitive Science.** Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in ICS Cog-

nitve Science Academic Programs. Same as LING 7775, CSCI 7772, EDUC 7775 and SLHS 7775.

## Social

**PSYC 2456-3. Social Psychology of Social Problems.** Examines social psychological aspects of a variety of issues, ranging from problems of poverty or minority status to topics such as prejudice, drug use, student protest, and patterns of sexual behavior.

**PSYC 2606-3. Social Psychology.** Covers general psychological principles underlying social behavior. Analyzes major social psychological theories, methods, and topics, including attitudes, conformity, aggression, attraction, social perception, helping behavior, and group relations. Prereq., PSYC 1001. Credit not granted for this course and PSYC 4406. Approved for arts and sciences core curriculum: contemporary societies.

**PSYC 3006-3. Psychology of Money: Propaganda, Seigniorage, Cognition, and Personal Economic Decision Making.** Explores the various ways that money has influenced human affairs from the earliest use of metal coins through the contemporary emergence of electronic money. Lectures will be supplemented with exhibits drawn from the CU coin cabinet. Prereq., PSYC 1001. Same as PSYC 3000.

**PSYC 4136-4. Judgment and Decision Making.** One lab, three lectures per week. Introduces the study of judgment and decision making processes (estimation, prediction and diagnosis, choice under certainty, and risky decision making) and the methods that have been developed to improve these processes (statistical modeling, decision analysis, and expert systems). Prereqs., PSYC 1001, 2606 and 3101. Same as PSYC 5135.

**PSYC 4376-4. Research Methods in Social Psychology.** Designed primarily for psychology majors interested in learning about research methodology. Topics include research design, data collection and data analysis, and written research reports. Prereqs., PSYC 1001, 2606, and 3101.

**PSYC 4456-3. Psychology of Personality.** Offers a psychological study of structure, organization, and development of the person as a whole. Analysis of major theories, methods, and research, including topics such as emotion, motivation, temperament, inner experience, identity and the self, personality change, and the influence of sociocultural context. Restricted to juniors and seniors.

**PSYC 4606-3. Advanced Topics in Social Psychology.** In-depth study of selected topics in social psychology. Particular section content each semester is determined by the instructor. May be repeated for a maximum of 6 credit hours, provided the topics vary. Prereqs., PSYC 1001, 2606 and 3101.

**PSYC 5606-3. Proseminar: Social-Personality Psychology.** Provides a thorough introduction to methods and theories in social psychology concerned with topics such as the self, social cognition, judgment and decision making, attitude formation and change, small group processes, inter-group relations, health and social psychology, and others. May be repeated up to 12 total credit hours. Prereq., instructor consent.

**PSYC 6606-1. Professional Issues in Social Psychology.** Covers a range of topics important for professional development in social psychology, including preparation and delivery of research presentations, preparation of grant proposals and manuscripts, and peer review of manuscripts. Intended to prepare students for careers as research scientists. May be repeated up to 6 total credit hours. Restricted to graduate students.

**PSYC 7536-2. Personality and Social Psychology.** Selected topics in the area of social-personality psychology. Students may register for more than one section of this course within the term and/or within their graduate career. These seminars may be on one of the following topics: stereotyping and person perception, social psychology and self, social psychology of problem behavior, health and social psychology, race and ethnic identity, or groups and small group organization. May be repeated up to 8 total credit hours. Prereq., instructor consent.

## Religious Studies

**RLST 1620-3. Religious Dimension in Human Experience.** Studies religion as individual experience and social phenomenon. Examines varieties of religious language (symbol, myth, ritual, scripture) and of religious experience (Asian,

Western, archaic). Approved for arts and sciences core curriculum: ideals and values.

**RLST 2220-3. Religion and Dance: Africa to America to Africa.** Religions in cultures around the world frequently engage in dance. By focusing on dances and forms of movement, religious beliefs and meanings can be seen and appreciated. Studies select religious cultures from around the world. Theory is developed to interrelate religion and dance. Similar to RLST 2200. Complements RLST 2230.

**RLST 2230-3. Religion and Dance: India to Ballet.** Religions in cultures around the world frequently engage in dance. The study of dancing in cultures from India to Europe and America deepens understanding and appreciation of these peoples in their diversities and similarities. Similar to RLST 2200. Complements RLST 2220.

**RLST 2400-3. Religion and Contemporary Society.** Studies the nature of contemporary American society from various theoretical perspectives in religious studies. Gives attention to the impact of secularization and to the religious elements found in aspects of secular life (e.g., politics, literature, education, and recreation). Approved for arts and sciences core curriculum: contemporary societies.

**RLST 2500-3. Religions in the United States.** Explores the development of various religions within the shaping influences of American culture, including separation of church and state, the frontier experience, civil religion, and the interaction of religions of indigenous peoples, immigrants, and African Americans. Approved for arts and sciences core curriculum: United States context or ideals and values.

**RLST 2600-3. Judaism, Christianity, and Islam.** Introduces literature, beliefs, practices, and institutions of Judaism, Christianity, and Islam, in historical perspective. Same as JWST 2600. Approved for arts and sciences core curriculum: ideals and values.

**RLST 2610-3. Religions of South Asia.** Introduces the literature, beliefs, practices, and institutions of Hinduism, Buddhism, Jainism, and Sikhism, in historical perspective. Approved for arts and sciences core curriculum: ideals and values.

**RLST 2620-3. Religions of East Asia.** Introduces literature, beliefs, practices, and institutions of Taoism, Confucianism, Buddhism, and Shintoism in historical perspective. Approved for arts and sciences core curriculum: ideals and values.

**RLST 2700-3. American Indian Religious Traditions.** Introduces religions of the peoples indigenous to the Americas. Concerns include ritual, mythology, and symbolism occurring throughout these cultures in such areas as art, architecture, cosmology, shamanism, sustenance modes, trade, and history. Same as ETHN 2703. Approved for arts and sciences core curriculum: human diversity or ideals and values.

**RLST 2800-3. Women and Religion.** Examines roles of women in a variety of religious traditions including Judaism, Christianity, Hinduism, Buddhism, and goddess traditions. Same as WMST 2800. Approved for arts and sciences core curriculum: human diversity.

**RLST 2840 (1-3). Independent Study.** May be repeated up to 8 total credit hours.

**RLST 3000-3. Christian Traditions.** Studies origins and development of various aspects of Christian tradition as expressed through scripture, theology, ritual, church order, ethics, and the arts. Approved for arts and sciences core curriculum: historical context.

**RLST 3020-3. Advanced Writing in Religious Studies.** Seminar for religious studies majors that emphasizes the development of writing skills for use inside as well as outside the academy. Writing assignments are focused on one or more core topics in religious studies. Restricted to RLST majors. Approved for arts and sciences core curriculum: written communication.

**RLST 3050-3. Religion and Literature in America.** Studies religious dimensions of American culture through representative literature, beginning with the Puritans and focusing on diversity in the 19th and 20th centuries. Approved for arts and sciences core curriculum: United States context.

**RLST 3100-3. Judaism.** Explores Jewish religious experience and its expression in thought, ritual, ethics, and social institutions. Same as JWST 3100. Approved for arts and sciences core curriculum: historical context.

**RLST 3200-3. Hinduism.** Studies literature, beliefs, practices, and institutions of Hinduism, in historical perspective.

**RLST 3300-3. Foundations of Buddhism.** Introduction to Buddhist thought and practice in the variety of its historical and cultural contexts. The course begins with an exploration of narrative, cosmology, doctrine and ritual in early Buddhism and the Theravada of South and Southeast Asia. Through case studies, we then trace diverse conceptions of the Buddhist path in Tibet and East Asia where the Mahayana spread. Restricted to sophomores, juniors and seniors.

**RLST 3400-3. Japanese Religions.** Studies the literature, beliefs, practices, and institutions of Shinto, Buddhism, and Confucianism within the development of Japanese culture.

**RLST 3600-3. Islam.** Introduces Islamic beliefs and practices through an examination of the Qur'an, Muhammad's life, ritual duties, law and theology, mysticism, and social institutions.

**RLST 3800-3. Chinese Religions.** Studies classical Confucianism, Taoism, Buddhism, and Neo-Confucianism within the historical context of Chinese culture.

**RLST 3820-3. Topics in Religious Studies.** Intensive study of a selected area or problem in religious studies. May be repeated up to 9 total credit hours as topics change.

**RLST 3830-3. Perspectives on the Study of Religion.** Offered each fall semester. Surveys basic approaches to the study of religion. Students read and respond to seminal works in religious studies selected by faculty members, who visit class for discussions. Students also visit several religious communities in the Boulder/Denver region. Restricted to and required for junior and senior RLST majors.

**RLST 3838-3. Dancing, Religion, and Culture.** A critical examination of the received cultural, religious, and academic understandings of dancing and the body; the construction of a richer theory of dancing that will more adequately support comparative studies; the study of dancing in cultures and religions in a diverse representation of cultures; and a more in depth social study of Latin American dancing including actual dancing experience.

**RLST 4020-3. Topics in Biblical Christianity.** Studies Christian origins, treatment of the historical person of Jesus, and theological perspectives of the New Testament. Emphasizes methodology, e.g., textual criticism, literary criticism, and form criticism. Variable topics include synoptic gospels, John, and Pauline writing. May be repeated up to 9 total credit hours as topics change. Prereq., 6 credit hours of RLST courses at any level or instructor consent. Same as RLST 5020.

**RLST 4030-3. Religions in America.** Studies various religious movements in the U.S. and other parts of the Americas. Includes American religion and religions, religion and nationalism, revitalization and religion, and Asian religions in America. May be repeated up to 9 total credit hours within a term as topics change. Prereq., 6 hours RLST or instructor consent. Same as RLST 5030.

**RLST 4050-3. Topics in Christian Studies.** Studies a particular topic in Christian theology and culture such as early Christianity, medieval Christianity, Christianity in the United States, women and Christianity, liberation theologies, Christianity and literature, and modern Christian thought. May be repeated up to 9 total credit hours as topics change. Prereqs., 6 hours of RLST courses at any level or instructor consent. Same as RLST 5050.

**RLST 4200-3. Topics in Hinduism.** Examines in depth central themes, schools of thought, and movements in Hinduism, such as myth and ritual, renunciation, Vedanta, and 19th century Renaissance. May be repeated up to 9 total credit hours as topics change. Prereqs., 6 hours of RLST courses at any level or instructor consent. Same as RLST 5200.

**RLST 4250-3. Topics in Buddhism.** Examines in depth central themes, schools of thought, and movements in Buddhism, such as Theravada in Southeast Asia, Mahayana and Tantrayana thought, Zen, and Buddhism in America. May be repeated up to 9 total credit hours as topics change. Prereqs., 6 hours of RLST courses at any level including RLST 3300 or instructor consent. Same as RLST 5250.

**RLST 4300-3. Topics in Native American Religions.** Examines a topic (varies at different offerings) focusing on religions of peoples indigenous to



the Americas. May consider mythology; shamanism and medicine; trickster, clown, and fool; and crisis cult movements. May be repeated up to 9 total credit hours as topics change. Prereqs., RLST 2700 and 3 additional credit hours of RLST course work or instructor consent. Same as RLST 5300.

**RLST 4650-3. Islam in the Modern World.** Globally surveys Islam, covering religion and politics; Islam and the West; the Islamic revival and its varied forms in Iran, Indonesia, Libya, and Pakistan; development and change; the status of women; and media and academic stereotyping. Prereq., 6 credit hours of religious studies at any level or instructor consent. Same as RLST 5650.

**RLST 4750-3. Daoism.** A detailed examination of the history and current state of Daoism, China's indigenous organized religion. Focusing on its origins and development, ethnical teachings, ritual activities, and world view. Topics created include the relationship of Daoism to popular religion, the practice of alchemy and self cultivation, beliefs concerning death and the afterlife, and the structure of the Daoist pantheon. Prereq., RLST 3800 or instructor consent. Same as RLST 5750 and CHIN 4750.

**RLST 4800-3. Critical Studies in Religion.** Focuses on a current issue or area of research in the study of religion. Students analyze the way theories develop and learn to develop their own critical analysis. Topics vary, e.g., comparative kingship, colonialism, ritual theories, feminist analysis. May be repeated up to 6 total credit hours. Restricted to RLST majors.

**RLST 4810-3. Honors Thesis.** Students write an honors thesis based on independent research under the direction of a faculty member. Required for students who elect departmental honors.

**RLST 4820-3. Interdisciplinary Seminar on Religion: Topics.** Variable topics in religion, drawing from a variety of disciplines and methodologies as they shed light on specific traditions and issues. May be repeated up to 9 total credit hours as topics change. Prereq., 6 credit hours of religious studies at any level or instructor consent. Same as RLST 5820.

**RLST 4830-3. Senior Majors Seminar.** Topics and instructors vary. Brings advanced majors together in order to focus their major experience on significant topics and issues of common interest. Restricted to majors.

**RLST 4840 (1-6). Senior Independent Study.** May be repeated up to 8 total credit hours.

**RLST 5020-3. Topics in Biblical Christianity.** Same as RLST 4020.

**RLST 5030-3. Religions in America.** Same as RLST 4030.

**RLST 5050-3. Topics in Christian Studies.** Same as RLST 4050.

**RLST 5200-3. Topics in Hinduism.** Same as RLST 4200.

**RLST 5250-3. Topics in Buddhism.** Same as RLST 4250.

**RLST 5300-3. Topics in Native American Religions.** Same as RLST 4300.

**RLST 5650-3. Islam in the Modern World.** Same as RLST 4650.

**RLST 5750-3. Daoism.** Restricted to graduate students. Same as RLST 4750 and CHIN 5750.

**RLST 5820-3. Interdisciplinary Seminar on Religion.** Same as RLST 4820.

**RLST 5840 (1-6). Independent Study.** May be repeated up to 8 total credit hours.

**RLST 6830-3. Introduction to the Academic Study of Religion.** Introduction to the graduate academic study of religion through the exploration of contemporary models and issues that demonstrate the nature and future of the field. Each student will prepare a profile of his/her intended area of research. Restricted to Religious Studies graduate students.

**RLST 6840 (1-6). Independent Study.** May be repeated up to 8 total credit hours.

**RLST 6850-3. Comparative Studies in Religion.** Focuses on theories and methods of comparative study in religion through an examination of at least two distinct traditions (e.g., public worship in Judaism and Islam; pilgrimage in Hinduism and Christianity). May be repeated up to 6 total credit hours as topics change. Restricted to RLST graduate students.

**RLST 6940 (1-3). Master's Degree Candidate.**

**RLST 6945 (1-4). Directed Readings: Non-Thesis Option.** Course work finished or in the last semester. May be repeated up to 4 total credit hours.

**RLST 6950 (1-4). Master's Thesis.**

## Sanskrit

**SNSK 1010 (3-4). Introductory Sanskrit 1.**

**SNSK 1020 (3-4). Introductory Sanskrit 2.** Prereq., SNSK 1010.

**SNSK 2110 (3-4). Intermediate Sanskrit 1.** Continued study of the grammar of classical Sanskrit and translation of selected readings from the literature. Meets MAPS requirement for foreign language. Prereq., SNSK 1020.

**SNSK 2120 (3-4). Intermediate Sanskrit 2.** Continuation of SNSK 2120. Prereq., SNSK 2110.

## Sewall Residential Academic Program

**SEWL 1000 (1-3). Topics: Humanities 1.**

**SEWL 1020 (1-3). Topics: Social Sciences 1.**

**SEWL 2000-3. America, the Environment, and the Global Economy.** Examines the debate over globalization and the global environmental crisis. Does increasing global economic development threaten to undermine the environment? What role should America play in the development of a sustainable economy? Credit not granted for this course and SOCY 1002. Approved for arts and sciences core curriculum: ideals and values.

**SEWL 2020-1. Civic Engagement.** Explores the concept of citizenship and develops students' leadership skills through discussions and service-learning. Working with Sewell faculty mentors, students discuss citizenship and related topics and learn concretely about aspects of the larger community by choosing a local community organization, becoming actively involved in its programs, and presenting their work at a culminating symposium. May be repeated up to 4 total credit hours.

## Sociology

*Sociology courses numbered at the 1000- and 2000-level are designed for first- and second-year students (fewer than 56 credit hours). Sociology courses numbered at the 3000- or 4000-level are restricted to students with 56 credit hours or more, or those with instructor consent.*

### General Sociology

**SOCY 1001-3. Introduction to Sociology.** Examines basic sociological ideas including social relations, social interaction, social structure, and social change. Examples are drawn from societies around the world. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: contemporary societies.

**SOCY 1021-3. United States Race and Ethnic Relations.** An examination of race and minority problems in U.S. society, including the psychological, social, and cultural sources of prejudice and discrimination. Approved for arts and sciences core curriculum: United States context.

**SOCY 1841 (1-6). Independent Study in Sociology.** May be repeated up to 7 total credit hours.

**SOCY 2011-3. Contemporary Social Issues and Human Values.** Explores contemporary societies on a global scale. Focuses on such issues as capitalism, socialism, race and ethnic problems, sex discrimination, poverty and the concentration of wealth, crime and deviance, human rights and human values, peace and war.

**SOCY 2021-3. Nonviolence and the Ethics of Social Action.** Examines nonviolence as a strategy of social action. Focuses on ethics and dynamics of non-violent action; racial and economic justice movements; civil disobedience; and conscientious objection to war.

**SOCY 2031-3. Social Problems.** Examines U.S. society from a normative perspective emphasizing theories of social change. Considers such problems as distribution of power, unemployment, poverty, racism and sexism, the changing role of the family, and drugs. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 2041-3. The Social Construction of Reality.** Analyzes the human environment as a human product. Studies how all things that construct the objec-

tive social facts of our social world are created, reproduced, maintained, and distributed by specific human interaction processes.

**SOCY 2061-3. Introduction to Social Statistics.** Introduces students to quantitative analysis of social phenomena. Emphasizes understanding and proper interpretation of graphs; measures of central tendency, dispersion, and association; and the concept of statistical significance. Assumes students have only limited mathematical background.

**SOCY 2071-1. Career Development Theories and Practices.** Studying and applying career development theories, this course will focus on gaining understanding of the world of work from a variety of perspectives to include the psychology, sociology, economics and history of work and careers in American society. Associated with these academic principles, this course will assist students' own career development and career management skills.

**SOCY 2091-3. Topics in Sociology.** Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content. Students may receive credit for this course up to three times for different topics.

**SOCY 3001-3. Classical Theory.** In-depth study of classical sociological theorists, particularly Marx, Durkheim, and Weber. Examines their roles in defining the discipline of sociology. Prereq., SOCY 1001. Restricted to sophomores, juniors and seniors.

**SOCY 3011-3. Contemporary Theory.** Continuation of SOCY 3001. In-depth study of modern and post-modern theories of the 20th century, including structural-functionalist, conflict, symbolic interactionist, feminist, and world system theories. Prereq., SOCY 1001. Restricted to junior/senior SOCY majors.

**SOCY 3041-3. Self and Consciousness.** Explores human development from a psychosocial perspective, focusing on the interplay between psychological patterns and social forms. Issues such as self-image and social consciousness are studied within the larger context of individual and collective forces leading to transformation. Prereqs., SOCY 1001, and 3001 or 3011, or instructor consent. Restricted to junior/senior SOCY majors. Same as INVS 3041.

**SOCY 3141-3. Social Movements in the U.S.** Considers theory and research about American social movements. Emphasizes leadership, ideology, recruitment, strategy, organizational dynamics, public response, and reasons for success or failure. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors.

**SOCY 3151-3. Self in Modern Society.** Explores how modern social institutions and culture shape our personal experiences, how personal experiences can affect the nature of those, institutions and culture, and how strategies can be developed for achieving balance between the individual and society. Prereqs., SOCY 1001 and SOCY 3001/3011. Restricted to junior/senior SOCY majors. Approved for arts and sciences core curriculum: United States context or ideals and values.

**SOCY 3161-3. Sociological Perspectives on Race and Ethnicity.** Addresses three subtopics of race from a sociological perspective: ethnic and racial identities, immigration, and race and ethnicity in Latin America. Recommended prereq., SOCY 1001.

**SOCY 3171-3. Whiteness Studies.** Uses the conceptual framework of the sociology of race and ethnic relations to explore whiteness as a racial category that is centered and privileged in American society. Investigates the development of whiteness from past white supremacy, current colorblindness, to possible future multiculturalism. Analyzes the consequences of whiteness as a racial identity and a social structure. Prereqs., SOCY 1001 and 1021.

**SOCY 3301-3. Survey Methods.** Teaches quantitative research methods and, particularly, methods of survey research. Topics include sampling, interviewing, schedule construction, data analysis, computer methods, index construction, and statistical analysis. Students participate in a survey project, design, collect data, and prepare a research paper on the basis of collected data. Prereqs., SOCY 1001, 2061, and SOCY 3001 or 3011. Restricted to junior/senior sociology majors.

**SOCY 3401-3. Field Methods.** Skill development prepares students to conduct qualitative sociological research. Emphasizes ethnographic techniques, including intensive interviewing, direct observation, coding, participant observation, and report writing. Students conceive and execute a field research

project with data collection, analysis, and a report. Prereqs., SOCY 1001 and SOCY 3001 or 3011. Restricted to junior/senior sociology majors.

**SOCY 4021-3. Conflict Management in Social Systems.** Explores conflict resolution theory and method as applied to interpersonal, intergroup, and interorganization conflict. Prereqs., SOCY 1001, and SOCY 3001 or 3011.

**SOCY 4031-3. Social Psychology.** Studies individuals in social context. Reviews philosophical and sociological treatments of the relation between the individual and society. More specific topics include the socialization process, theories of human development and personality formation, language acquisition, conformity, aggression, sex differences in personality and gender identity, and the relation between attitudes and overt behavior. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors.

**SOCY 4061-3. Social Statistics.** Introduction to quantitative analysis of social phenomena. Emphasizes use of probability, statistical inference, analysis of variance, and multiple regression techniques for production of sociological research. Prepares students for more advanced-level statistics courses. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors.

**SOCY 4071-3. Social Stratification.** Studies theories of class, ethnic, sex, and age stratification. Examines social inequality in the United States and analyzes the resulting conflicts. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors. Same as SOCY 5071.

**SOCY 4081 (1-3). Sociology of Education.** Analyzes the school as a social organization. Among topics considered are power and control in the school; classroom interaction and its relation to learning and personality development in students; roles of educators; and reciprocal relations of school and community. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors.

**SOCY 4111-3. Nonviolent Social Movements.** Explores theories of democracy and development in relation to movements for nonviolent social change. Focuses on means and ends, spirituality, leadership, decision-making, civil society, cooperative economics, ecology, and decentralized power. Prereqs., SOCY 1001, and 3001 or 3011. Restricted to senior SOCY or PSCI majors. Same as INVS 4402.

**SOCY 4121-3. Sociology of Religion.** Examines complex interactions between religious and other social structures, such as the economy, government, and the family, and how globalization is affecting religious traditions across the globe. Includes discussion of how various religions are used or misused to justify terrorism and other acts of violence. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 4131 (1-3). Advanced Topics in Sociology.** Variety of advanced specialty courses taught by visiting and regular faculty designed for upper division sociology majors. See current departmental announcement for specific content. May be repeated up to 9 total credit hours for different topics. Prereq., SOCY 1001. Restricted to junior and senior SOCY majors.

**SOCY 4141-3. The Social Psychology of Friendships.** Studies friendships between individuals and groups, applying social psychological theories of interaction and group processes. Examines the effects of hierarchies of status and power and of norms and social pressure on friendships. Attempts to answer questions like how social categories like gender, race, and class affect friendships, what are the unwritten rules of behavior among friends in different situations, and what happens when we violate them. Prereq., SOCY 1001. Restricted to junior/senior SOCY majors.

**SOCY 4441-3. Senior Honors Seminar 1.** Helps students design and initiate an honors thesis based on original sociological research. Prereqs., SOCY 1001, and SOCY 3001 or 3011, and instructor consent. Restricted to SOCY majors with a minimum grade point average of 3.30.

**SOCY 4451-3. Senior Honors Seminar 2.** Helps students complete an honors thesis based on original sociological research. Emphasizes analyzing data, writing research reports, and presenting results. Prereqs., SOCY 1001, and SOCY 3001 or 3011, and instructor consent. Restricted to SOCY majors with a minimum grade point average of 3.30.

**SOCY 4461-3. Critical Thinking in Sociology.** Examines a sociological topic in depth, covering such issues as class structure, race relations, gender roles,

criminal justice, and political conflict, with an emphasis on writing, reading, and critical thinking. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to senior SOCY majors.

**SOCY 4841 (1-6). Independent Study in Sociology.** Upper-division variable credit. May be repeated up to 8 total credit hours. Prereqs., SOCY 1001, and SOCY 3001 or 3011, and instructor consent. Restricted to SOCY majors.

**SOCY 4911-3. Teaching Sociology.** Students participate in a teaching seminar under the supervision of a faculty member. Includes pedagogical strategies for implementing concrete educational goals and encouraging higher levels of creativity and analysis in a large, lower-division class. Emphasizes mentorship and personal development. Prereqs., SOCY 1004 and instructor consent.

**SOCY 4931 (1-6). Internship in Sociology.** Provides an academically supervised opportunity for junior and senior sociology majors to work in public or private organizations. Focuses on opportunities in criminal justice system, education, non-profits, health care, etc. May be repeated up to 6 total credit hours. Prereqs., SOCY 1001 and 3001 or 3011. Restricted to junior and senior SOCY majors.

**SOCY 5031-3. Research Design.** Principles and practice of social research, including the nature of scientific explanation, the relationship between theory and research, research design, measurement problems, sampling questionnaire construction, interviewing, ethnographic methods, and statistical analysis.

**SOCY 5071-3. Social Stratification.** Same as SOCY 4071.

**SOCY 5111-3. Data 1: Introduction to Social Statistics.** Introduces statistical analysis in the social sciences. Introduces basic techniques of inferential statistics and several bivariate statistical techniques including t-test for the difference in means, chi-square independence, analysis of variance (ANOVA), correlation, and simple regression (OLS). This course prepares students for the required course on multivariate regression techniques (Data 2).

**SOCY 5201-3. Graduate Seminar in Sociological Theory.** Examines theoretical approaches to core issues and problems in sociology, including the nature of society, the relationship between society and the individual, the role of culture and social structure, the sources of social power, and the conceptual structure of sociological knowledge itself.

**SOCY 5601-3. Advanced Data Analysis.** Extends general linear regression model to consider residual analysis, curvilinearity and interaction, and logistic regression. Includes completion of a written research paper. Prereqs., graduate standing and SOCY 5021.

**SOCY 5611-3. Teaching in Sociology.** Learn how to teach sociology more effectively while developing a new content area and a clearer sense of the field. Choose a content area within sociology as the basis for planning a course and developing and practicing different teaching techniques. Prereqs., enrollment in SOCY graduate program.

**SOCY 5841 (1-6). Independent Study in Sociology.** Graduate variable credit. May be repeated up to 7 total credit hours. Prereq., instructor consent.

**SOCY 6031-3. Globalization and Democratization: An Introduction.** Introduces research on globalization and democratization from an interdisciplinary perspective. Examines ongoing interdisciplinary research on the global political economy. Students learn about ongoing research, critique current efforts, and design their own research project. Prereq., graduate standing in PSCI, ECON, GEOG, or SOCY. Same as PSCI 7333, GEOG 5332, and ECON 8333.

**SOCY 6041-3. Cultural Sociology.** Explores "the cultural turn" in sociology and related disciplines. Reviews basic themes in cultural studies—e.g., distinguishing "cultural" and "social"; narrative as catalyst between symbols and practices; cultural production processes; self as embodied; culture and power; methods and epistemological issues. Students present their own projects in class and as research papers. Prereq., graduate standing. Formerly SOCY 5041.

**SOCY 6061-3. Modern Marxist Social Theory.** Analyzes recent Marxist theories of class structure, exploitation, political economy, alienation, culture, and the state as discussed in the work of Althusser, Gramsci, Lukacs, Mandel, Marcuse, Roemer, and others. Prereq., graduate standing. Formerly SOCY 5061.

**SOCY 6111-3. Data 2: Data Analysis.** Introduces students to mainstream multivariate regression techniques used in the social sciences. The majority of

the course focuses on the Ordinary Least Square model and on the extension of this model to nominal, ordinal, and count dependent variables. Students will analyze data of their choosing with statistical software packages including SPSS, SAS, and STATA. Prereq., SOCY 5111 or equivalent. Formerly SOCY 5021.

**SOCY 6121-3. Qualitative Methods.** Training in the systematic observation of people in situations, finding them where they are, staying with them in a role acceptable to them that allows intimate observations of behavior. Students report their findings in ways useful to social science but not harmful to those observed. Formerly SOCY 5121.

**SOCY 6821-1.5. Graduate Sociology Forum 1.** Introduces first-year graduate students to the full range of substantive topics, research programs, and other projects in which graduate sociology faculty are engaged. Provides a forum in which issues of the discipline are presented and discussed. Features weekly presentations by graduate sociology faculty. Restricted to graduate students.

**SOCY 6831-1. Graduate Professional Seminar.** Offers guidance and instruction on topics related to advanced graduate study and academic life beyond graduation. Discussions will include writing journal articles; creating a vitae; writing dissertations; applying for grants and other sources of funding; the academic job search; and what to expect as a junior faculty member. Restricted to graduate students.

**SOCY 6841 (1-6). Guided Research in Sociology.** May be repeated up to 7 total credit hours. Prereq., graduate standing.

**SOCY 6941 (1-6). Candidate for Degree for Master's Thesis.**

**SOCY 6951 (1-6). Master's Thesis.**

**SOCY 7111-3. Data III: Advanced Data Analysis.** Denotes third graduate course in sequence of quantitative methods. Following basic inferential statistics (SOCY 5111) and multivariate regression analysis (SOCY 6111), students study advanced statistical techniques such as event history analysis, multilevel modeling, structural equation modeling, and latent class analysis. May be repeated up to 9 total credit hours when topics vary. Prereqs., SOCY 5111 and 6111 and graduate standing.

**SOCY 7121-3. Qualitative Analysis.** Drawing on data gathered through participation, observation, and in-depth interviewing, students focus on developing theoretical analyses and exploring classical and post-modern ethnographic writing formats. Students present and revise their papers as well as review journal articles. Prereqs., graduate standing and SOCY 5121 or 6121, or instructor consent. Formerly SOCY 5221.

**SOCY 7131-3. Seminar in Social Psychology.** Studies the individual in social context. Focuses on theoretical perspectives and substantive issues specific to sociological and social psychology, including socialization, the self, social roles, language, deviance, gender, collective behavior, group processes, attitudes and behavior, social norms, and conformity. Formerly SOCY 5531.

**SOCY 7171 (1-3). Special Topics.** May be repeated up to 9 total credit hours.

**SOCY 8991 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Population and Health Issues

**SOCY 1022-3. Ethics and Social Issues in U.S. Health and Medicine.** Explores current ethical and policy issues in U.S. health and medical practices. Includes such issues as alcohol and drug abuse, organ transplants and substitutes, genetic engineering, contraception, abortion, occupational safety and health, and euthanasia. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 3002-3. Population and Society.** Examines population, its structure and processes, and its relationships to selected areas of the social structure. Examines Malthusian, neo-Malthusian, and Marxist perspectives. Restricted to SOCY majors.

**SOCY 3012-3. Women, Development, and Fertility.** Investigates the status of women and fertility in context of social and economic development. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors.

Same as WMST 3012. Approved for arts and sciences core curriculum: human diversity.

**SOCY 3042-3. Topics in Population and Health.** A variety of courses in population and/or health will be taught, usually by visiting lecturers. See current departmental announcements for specific content. May be repeated up to 9 total credit hours for different topics. Prereq., SOCY 1001.

**SOCY 4002-3. Sociology of Aging.** Studies present and future roles of the aged in the family, the community, and the larger society. Considers economic, political, and health consequences of various retirement systems. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors.

**SOCY 4042-3. Economic Sociology.** Defines relationship between economy and society; sociological approach to study of economic activity and organization; difference from the theoretical and methodological assumptions orienting the discipline of economics; tackles these questions in two ways: studies foundations as established in works of Smith, Marx, Weber, Polanyi, and Schumpeter, and considers current research in economic sociology, focusing on concepts of markets, networks, and embeddedness. Prereq., SOCY 1001. Restricted to sophomore, junior, senior SOCY majors.

**SOCY 4052-3. Social Inequalities in Health.** Focuses on social inequalities in health in both U.S. and international contexts. Reviews the link between health status and various types of social statuses, including but not limited to socioeconomic status, gender, race, and ethnicity. Explanations for the relationships between these factors and various health outcomes are discussed. The class focuses on multiple levels of analysis, from the physician-patient interactions to health care systems and social policies. Students have the opportunity to develop their own specific research interests in this field. Prereq., SOCY 1001. Restricted to junior/senior SOCY majors.

**SOCY 6012-3. Population Issues, Problems, and Policies.** Presents contemporary perspectives on relations between population and society. Focuses on mortality, fertility, and migration, the major demographic areas, with reviews of specific demographic phenomena and controversies. Formerly SOCY 5012.

**SOCY 7002-3. Social Disparities in Health.** Presents social disparities in health in their social context. Includes the sociology of health behavior; links between health status and social statuses including gender, race, ethnicity, and socioeconomic status; fundamental causes and other explanations for social disparities in health; environment and health; health insurance disparities; the physician-patient interaction and its consequences.

**SOCY 7012-3. The Social Demography of Race.** Introduction to relevant, timely research within sociological and social demographic research on race and ethnicity. Specific areas will include conceptual/measurement issues; population size, growth, and migration; health and mortality; marriage, family, and fertility; socioeconomic context; and policy considerations. Course content will be structured around current empirical pieces in sociology literature with emphasis on methodological approach in analyses.

## Deviance and Criminology

**SOCY 1004-3. Deviance in U.S. Society.** Examines the social construction of deviance in the U.S., the process of acquiring a deviant identity and managing deviant stigma, and the social organization of deviant act, lifestyles, relationships and careers. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 2034-3. Drugs in United States Society.** Examines the relationship between drugs and social contexts. Lends insight into why people find consciousness alteration meaningful, what kinds of experiences and problems arise, and what types of social policies emerge to control drug use.

**SOCY 2044-3. Crime and Society.** Explores issues related to crime, the criminal justice system, and crime-related public policy. It addresses what we know about crime and how we know it, how our society responds to crime, and how the institutions designed to address crime (police, courts, corrections) function.

**SOCY 3034-3. Perspectives on Violence.** What counts as violence? Who decides what is violence and what is not? In what contexts does violence occur? This course critically examines different criminological and social science perspectives on violence. Prereq., SOCY 1001 or 1004.

**SOCY 3044-3. Race, Class, Gender, and Crime.** Overview of race, class, gender, and ethnicity issues in offending, victimization, and processing by the justice system. Examines women and people of color employed in the justice system. Prereq., SOCY 1001 or 1004. Same as WMST 3044.

**SOCY 3314-3. Violence Against Women and Girls.** Focuses on aspects of the victimization of women and girls that are "gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence. Same as WMST 3314.

**SOCY 4004-3. Advanced Topics in Criminology.** Variety of courses in criminology. See current departmental announcements for specific content. May be repeated up to 9 total credit hours for different topics. Prereq., SOCY 1001 or 1004. Restricted to junior/senior SOCY majors.

**SOCY 4014-3. Criminology.** Scientific study of criminal behavior with special attention to development of criminal law, definition of crime, causes of law violation, and methods of controlling criminal behavior. Prereq., SOCY 1001 or 1004.

**SOCY 4024-3. Juvenile Delinquency.** Examines the history, incidence and prevalence of delinquent behavior, as well as why children become involved in criminal activity. Prereq., SOCY 1001 or 1004. Approved for arts and sciences core curriculum: contemporary societies.

**SOCY 4054-3. Policing and the Courts.** Looks at the criminal justice process from arrest through appeal. Topics include: the role of police, prosecutorial decision making, plea bargaining, judicial selection, and the conduct of trials, sentencing, and appeal. Prereq., SOCY 1001 or SOCY 1004. Credit not granted for this course and SOCY 2024.

**SOCY 4084-3. Punishment, Law, and Society.** Places the current state of punishment in the U.S. in historical and cross national context. It examines key features of penal systems, and key sociological theories about the relationship between punishment and society. Prereqs., SOCY 1001 or 1004.

**SOCY 6004-3. Topics in Criminology.** Variety of courses in criminology to be taught by visiting lecturers. See current departmental announcements for specific content. May be repeated up to 9 total credit hours for different topics. Formerly SOCY 5004.

**SOCY 7004-3. Criminological Theory.** Examines the major criminological theories of the 18th through 21st centuries in Europe, Australia, and the U.S. Emphasizes the historical contexts and paradigms of knowledge influencing these theories. Prereq., graduate standing. Formerly SOCY 5114.

**SOCY 7014-3. Patterns of Criminal Behavior.** Overview of the epidemiology of crime. Examines patterns of crime (both offending and victimization), and includes a gender, race/ethnicity, and class analysis. Formerly SOCY 5214.

**SOCY 7024-3. Punishment and Social Control.** Exploration of sociological perspectives on the criminal justice process. Considers organization of criminal law responses, including enforcing and sentencing. Race, class, gender, and age differences in treatment and sentencing are analyzed. Prereq., graduate standing. Formerly SOCY 5314.

**SOCY 7034-3. Capital Punishment in the United States.** Surveys the history and current status of capital punishment in the United States, with a critical examination of arguments both for and against the death penalty. Prereq., graduate standing. Formerly SOCY 5414.

## Sex and Gender

**SOCY 1006-3. The Social Construction of Sexuality.** Discusses the social determinants of sexuality. Analyzes the economic, psychological, and cultural influences on human sexuality. Interactional perspective of human sexuality is presented. Restricted to sophomores, juniors, and seniors. Same as WMST 1006.

**SOCY 1016-3. Sex, Gender, and Society 1.** Examines status and power differences between the sexes at individual and societal levels. Emphasizes historical context of gender roles and status, reviews major theories of gender stratification. Same as WMST 1016. Approved for arts and sciences core curriculum: human diversity.

**SOCY 3016-3. Marriage and the Family in U.S. Society.** Comparative and historical examination of marriage and the family within the U.S. Emphasizes changing family roles and family structures. Also considers alternatives to

the nuclear family and traditional marriage exploring new definitions of family. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors. Same as WMST 3016. Approved for arts and sciences core curriculum: United States context.

**SOCY 3046-3. Topics in Sex and Gender.** Faculty present courses based on their area of expertise and specialization in the field of sex and gender. Students should check current sociology department notices of course offerings for specific topics. Students may receive credit for this course up to three times for different topics. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/ senior SOCY majors. Same as WMST 3046.

**SOCY 4016-3. Sex, Gender, and Society 2.** Studies status and power differences between the sexes at individual, group, and societal levels. Examines empirically established sex differences, and reviews biological, psychological, and sociological explanations for gender differences. Prereqs., SOCY 1016 or WMST 2000. Restricted to junior/senior SOCY majors. Same as WMST 4016.

**SOCY 4086-3. Family and Society.** Studies the changing relationship between family and social structure. Examines variations in family organization and considers political, social, ideological, demographic, and economic determinants of family formation. Prereqs., SOCY 1001, and SOCY 3001 or 3011. Restricted to junior/senior SOCY majors. Same as WMST 4086.

**SOCY 6016-3. Topics in Sex and Gender.** Covers diverse specializations of faculty in the area of sex and gender. See current departmental announcements or online Schedule Planner for specific content. May be repeated up to 9 total credit hours for different topics. Formerly SOCY 5016.

**SOCY 7006-3. Sociology of Sex and Gender.** Theoretical and empirical examination of sex stratification, sex role differentiation, and sex differences in socialization, personality, institutions, and culture. Formerly SOCY 5006.

**SOCY 7026-3. Feminist Research Methods.** Epistemological and methodological issues generated by feminist research and students' own projects. Formerly SOCY 5026.

**SOCY 7036-3. Feminist Theory.** Examines the main schools of feminist thought and their impact upon sociological theories. Also examines current feminist theoretical debates and their relevance to feminist sociology. Prereq., graduate standing. Formerly SOCY 5036.

## Environment and Society

**SOCY 2077-3. Environment and Society.** Examines how both natural and built environments influence human behavior and social organization. Focuses on microenvironments and their influence on individuals; the impact of macroenvironments on societal organization; and environmental movements. Credit not granted for this course and SOCY 3091. Approved for arts and sciences core curriculum: ideals and values.

**SOCY 4007-3. Global Human Ecology.** Examines global environmental issues from sociological perspectives. Focuses on such problems as overpopulation, world hunger and poverty, pollution, resource shortages, environmental impact of technology and population dynamics, public policy, and strategies for change. Credit not granted for this course and SOCY 1002 or SEWL 2000.

**SOCY 4017-3. Animals and Society.** Examines the role of non-human animals in human society. Investigates the social construction of the human/animal boundary. Challenges ideas that animals are neither thinking nor feeling. Examines the many ways humans rely on animals. Considers the link between animal cruelty and other violence. Explores the moral status of animals. Prereq., SOCY 1001.

**SOCY 4027-3. Inequality, Democracy, and the Environment.** Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between (a) inequality and democratic decision making and (b) undemocratic decision making; U.S. and corporate food and energy policy; and global environmental degradation. The course also focuses on the role that global inequality plays in fostering environmental degradation. Restricted to juniors/seniors. Same as ENV5 4027.

**SOCY 4037-3. Hazards, Disasters, and Society.** Explores the societal dimensions of hazards and disasters, emphasizing disaster theory and research, key issues in the sociological study of disasters, social vulnerability, the

impacts of disasters in the U.S. and worldwide, and the U.S. Emergency Management System. Prereq., SOCY 2077. Same as SOCY 5037.

**SOCY 4047-3. Topics in Environment and Society.** Variety of courses taught by visiting and regular faculty. See current departmental announcements for specific content. May be repeated up to 9 credit hours for different topics.

**SOCY 5037-3. Hazards, Disasters and Society.** Same as SOCY 4037.

**SOCY 5937 (1-6). Graduate Research Internship in Environmental Sociology.** Offers the opportunity for sociology graduate students specializing in environmental sociology to work with local governmental or non-profit organizations on research assignments. The research topic, academic reading list, and expectations for the final project will be developed collaboratively with a faculty sponsor and organizational representative.

**SOCY 6007-3. Foundations of Environmental Sociology.** Provides overview of environmental sociological theory and research including topics such as: public environmental perception, concern, and knowledge; environmentalism as a social movement; environmental justice; energy, technology, and risk; human dimensions of environmental change; and natural hazards and disasters. Same as ENV5 6007.

**SOCY 6017-3. Inequality, Democracy, and the Environment.** Focuses on the structural forces affecting environmental degradation and environmental behavior by examining the relationships between A) inequality and democratic decision making and B) undemocratic economic and political decision making, U.S. and corporate food and energy policy; and global environmental degradation. Focus will also be placed on the role that global inequality plays in fostering environmental degradation. Prereq., graduate standing. Formerly SOCY 5137.

**SOCY 7017-3. Population and Environment.** Reviews research on human-environment interactions, with a focus on ways in which demographic processes influence, and are influenced by, the environmental context. Specific topics include conceptual and analytical frameworks; methodologies; intervening factors shaping human dimensions of environmental change; and regionally-focused research. Prereq., graduate standing. Formerly SOCY 5117.

## Spanish and Portuguese

### Spanish

**SPAN 1000-3. Cultural Difference through Hispanic Literature.** For freshmen only. Organized around the general topic of cultural differences. Focuses on a related issue such as gender or history articulated in the literature of Spain, Latin America, and the Hispanic United States. Taught in English; students read selected literary texts in English from the various traditions. Does not count towards the Spanish major. Approved for arts and sciences core curriculum: literature and the arts.

**SPAN 1010-5. Beginning Spanish 1.** Offers students a firm command of Spanish grammar. Grammar is used as a point of departure for development of oral skills. Reading and writing are stressed to a lesser degree. Attendance at the language laboratory may be mandatory. Credit not granted for this course and SPAN 1150.

**SPAN 1020-5. Beginning Spanish 2.** Continuation of SPAN 1010. Attendance at the language laboratory may be mandatory. Prereq., SPAN 1010 (min. grade of C-), or placement. Credit not granted for this course and SPAN 1150.

**SPAN 2110-3. Second-Year Spanish 1.** Grammar review. Emphasizes reading, writing, and speaking skills. Attendance at the language laboratory may be mandatory. Prereq., SPAN 1020 (min. grade C-), or placement. Credit not granted for this course and SPAN 2150. Meets MAPS requirement for foreign language.

**SPAN 2120-3. Second-Year Spanish 2.** Grammar review. Emphasizes reading, writing, and speaking skills. Attendance at the language laboratory may be mandatory. Prereq., SPAN 2110 (min. grade C-) or better, or placement. Credit not granted for this course and SPAN 2150.

**SPAN 2150-5. Intensive Second-Year Spanish.** Intensive review of grammar and other subjects covered in SPAN 2110 and 2120. Attendance at the language laboratory may be mandatory. Prereq., SPAN 1020 (min. grade of C-), or placement and departmental approval. Credit not granted for this course and SPAN 2110 or 2120. Meets MAPS requirement for foreign language.

**SPAN 3000-5. Advanced Spanish Language Skills.** Transitional course that introduces students to the Spanish major and improves their writing skills. Involves composition, reading, and to a lesser extent, conversation. Prereq., SPAN 2120 or 2150 (min. grade C-), the equivalent, or placement.

**SPAN 3001-3. Spanish Conversation.** Emphasizes vocabulary acquisition and speaking fluency. Through structured and carefully monitored individual, group, and class work, students achieve enduring language growth and meaningful acculturation that otherwise could only be achieved through an extended stay in an Hispanic country. This course is intended for those who are learning Spanish as a second-language. Native speakers of Spanish who have pursued formal education in a Spanish speaking country will not be admitted to the course. Heritage speakers of Spanish (native speakers who have pursued formal education in a non-Spanish speaking setting) as well as students from bi-lingual K–12 programs must meet with the coordinator to determine appropriate class level. Prereqs., SPAN 2120 or 2150 (min. grade C-), the equivalent, or placement. Credit not granted for this course and SPAN 3002. Does not count toward the Spanish major.

**SPAN 3002-3. Advanced Spanish Conversation.** Designed for Spanish majors, this course focuses on refining fluency in both informal and formal discourse through group discussions, class work, and individual and group presentations with a focus on preparing students for communication in professional settings. To that end, the materials used in the course will emphasize themes and problems relevant to the contemporary Hispanic world. Prereq., SPAN 3000 (min. grade C-) or equivalent. Credit not granted for this course and SPAN 3001.

**SPAN 3030-3. Professional Spanish for Business 1.** Includes the study of business vocabulary, business concepts, geographic context, and cultural context. Prereq., SPAN 3000.

**SPAN 3040-3. Professional Spanish for Business 2.** Continuation of SPAN 3030 with more emphasis on interpreting and elementary translation. Some attention is given to the writing of resumes and application letters, as well as to the entire job-search process. Prereqs., SPAN 3000, 3030.

**SPAN 3050-3. Spanish Phonology and Phonetics.** Designed to teach some of the methods, techniques, and tools of descriptive linguistics as they apply to articulatory phonetics. Students analyze important contrasts between sounds of Spanish and English by means of phonetic transcription. Prereq., SPAN 3000.

**SPAN 3100-3. Literary Analysis.** Students read short stories and other brief narrative texts, critical and creative essays, short plays, and poems to facilitate the acquisition of critical skills in identification of basic ideological and formalistic issues within texts being studied. Prereq., SPAN 3000 or equivalent.

**SPAN 3120-3. Advanced Spanish Grammar.** Analysis of texts from morphological and syntactic perspectives. Structural and semantic characteristics of major features of Spanish are studied at the sentence level. Use of these grammatical features is then studied in selected literary texts. Prereq., SPAN 3000 or equivalent.

**SPAN 3150-3. Linguistic Analysis of Spanish.** Introduces students to fundamental areas of linguistic analysis with special attention paid to Spanish (and Portuguese). The structural systems of language will be introduced (principles of sound patterns, word formation, meaning, and sentence structure). Different types of language variation will be discussed (historical, social, regional). Prereq., SPAN 3000 or equivalent.

**SPAN 3200-3. Spanish Culture.** Examines historical bases of modern Spain's cultural and political currents. Prereq., SPAN 3000.

**SPAN 3210-3. The Cultural Heritage of Latin America.** Examines literary, artistic, and philosophical currents in Latin America beginning with pre-Columbian indigenous cultures and continuing to the present. Prereq., SPAN 3000. Credit not granted for this course and SPAN 3220.

**SPAN 3220-3. Latin American Culture: Spanish America and Brazil.** Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present. Taught in Spanish. Prereq., SPAN 3000. Recommended prereqs., PORT 2110 and 2120. Credit not granted for this course and SPAN 3210. Same as PORT 3220.

**SPAN 3310-3. 20th Century Spanish Literature.** Surveys leading writers of Spain from 1898 until the present. Prereq., SPAN 3100.

**SPAN 3340-3. 20th Century Spanish American Literature.** Introduces contemporary Spanish American literature. Prereq., SPAN 3100.

**SPAN 3800-3. Selected Readings: Latin American Literature in Translation.** Introduces selected Latin American (Spanish and Portuguese) literature masterpieces. Taught in English. Does not count toward the Spanish major.

**SPAN 4010-3. Advanced Rhetoric and Composition.** Designed to improve written expression in Spanish. Offers a detailed study of nuances of grammar points most difficult for students. Gives attention to errors in student compositions and to various styles of written Spanish. Prereqs., SPAN 3100 and 3120 or equivalent.

**SPAN 4060-3. Problems of Business Translation in Spanish 1.** Develops skills in English-Spanish and Spanish-English translation and interpretation. Prereq., SPAN 3040 or equivalent.

**SPAN 4070-3. Problems of Business Translation in Spanish 2.** Legal and commercial documents are studied, prepared, and discussed to enable students to perform successfully in real translation situations. Prereq., SPAN 4060 or equivalent.

**SPAN 4110-3. Hispanic Women Writers.** Discusses the image of women in Spanish literature through the centuries using works by representative female writers. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4150-3. Masterpieces of Spanish Literature to 1700.** Treats major literary tendencies of Spanish literature from its origins to the end of the Baroque period. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4160-3. Masterpieces of Spanish Literature: 1700 to Present.** Requires a reading of selected masterpieces and an examination of major movements and figures in the literature of Spain from 1700 to the present. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4170-3. Masterpieces of Spanish American Literature to 1898.** Examines major works of Spanish American literature from the colonial period to the late 19th century. Emphasizes major figures and their works. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4180-3. Masterpieces of Spanish American Literature: 1898 to Present.** Examines major works of Spanish American literature from late 19th century to present. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4220 (1-3). Special Topics in Spanish and/or Spanish American Literature.** Examines intensively particular topics or issues concerning Spanish and/or Spanish American literature selected by the instructor. May be repeated up to 7 total credit hours. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4230-3. Special Topics in Luso-Brazilian and/or African Literature.** Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil, and/or the African countries of Portuguese colonization. Taught in Spanish. May be repeated up to 6 total credit hours. Prereqs., PORT 3230, SPAN 3100, 3120, and an additional course above SPAN 3000. Same as PORT 4230.

**SPAN 4430-3. Special Topics in Hispanic Linguistics.** Examines intensively particular topics or issues concerning Hispanic linguistics selected by the instructor. May be repeated up to 9 total credit hours on different topics. Prereqs., SPAN 3100, 3120, and an additional course above 3000.

**SPAN 4450-3. Introduction to Hispanic Linguistics.** Introduces students to the main areas of inquiry within the field of Hispanic linguistics. Topics to be covered include speech and language, phonetics and phonology, morphology and syntax, semantics, linguistic change and variation, and Spanish spoken in the United States. Prereqs., SPAN 3100, 3120, and an additional course above 3000. Same as SPAN 5450.

**SPAN 4500-3. Methods of Teaching Hispanic Literature and Cultures.** Introduces the methodologies associated with teaching Hispanic literature and culture in the secondary schools. Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000. Same as SPAN 5500.

**SPAN 4620-3. Cervantes.** Prereqs., SPAN 3100, 3120, and an additional course above SPAN 3000.

**SPAN 4650-3. Methods of Teaching Spanish.** Familiarizes students with current methodology and techniques in foreign language teaching. Peer-teaching coupled with opportunity to teach mini-lessons provide students with actual teaching experience in the foreign language classroom. Prereqs., SPAN 3100, 3120, an additional course above SPAN 3000, and admission to the teacher certification program or departmental approval. Same as SPAN 5650.

**SPAN 4660-6. High School Spanish Teaching.** Part of supervised secondary school teaching required for state certification to teach Spanish. These hours do not count toward student hours in the major nor in the total departmental hours allowed. The credit is pass/fail only. Prereq., SPAN 4650/5650.

**SPAN 4840 (1-3). Independent Study.** Departmental approval required. May be repeated up to 7 total credit hours.

**SPAN 4930 (1-4). Languages Internship for Professions.** Participants interested in public service or management-oriented careers in government or business are able to work as interns in public sector agencies or in private industry, on campus, or abroad. Prereqs., SPAN 3100 and 3200, an additional course above SPAN 3000, and departmental approval. Instructor consent required.

**SPAN 4980-1. Methods Language Learn/Pedagogy.** Required, intensive mini-course for teaching assistants in Spanish and Portuguese. Provides teachers with the opportunity to learn about language learning theory and pedagogy. Prereq., graduate standing or departmental consent.

**SPAN 4990-3. Spanish Honors Thesis.** May be repeated up to 7 total credit hours. Prereqs., 18 hours of upper-division Spanish (3.00 GPA overall and 3.50 GPA in Spanish).

**SPAN 5120 (1-3). Seminar: Spanish Literature and/or Spanish American Literature.** Selected topics in Spanish and/or Spanish American literature. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7120.

**SPAN 5130 (1-3). Seminar: Critical Approaches to Hispanic Literature.** Treats various topics and genres, as needs and resources dictate. Gives special attention to theoretical and critical analysis of Hispanic literature with greatest emphasis on contemporary trends. Genres might include narrative, poetry, and theatre. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7130.

**SPAN 5140-3. Seminar: Spanish Literature, Medieval Period.** Studies medieval works, authors, and themes, with consideration of principal influences from other literatures. Reading in Old Spanish. May be repeated up to 6 total credit hours. Prereq., graduate standing and SPAN 5420 or 7420 or instructor consent. Same as SPAN 7140.

**SPAN 5200-3. Seminar: Spanish Literature, Renaissance and Baroque.** Treats various topics, as needs and resources dictate. Special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include Renaissance poetry in Spain, Cervantes, *Don Quixote*, and *Novelas ejemplares*, picaresque novel, and the Spanish comedy of the 17th century. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7200.

**SPAN 5210 (2-4). Seminar: Spanish Literature, 18th and/or 19th Centuries.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include romantic prose, poetry and theatre, realism and naturalism (prose narrative), 19th century poetry, and 19th century theatre. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7210.

**SPAN 5220 (1-3). Seminar: Spanish Literature, 20th Century.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include the generation of 1898, poetry of the 20th century, theatre of the 20th century, pre-Civil War novel, and post-Civil War novel. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7220.

**SPAN 5300 (2-4). Seminar: Spanish American Literature, Colonial Period and/or 19th Century.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include pre-Columbian

literature, colonial prose and narrative, colonial poetry, romantic novel, the realist and naturalist novel and short story, 19th-century poetry, and gaucho literature. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7300.

**SPAN 5320 (1-3). Seminar: 20th Century Spanish American Literature.** Treats various topics, as needs and resources dictate. Gives special attention to developing historical and current theoretical and critical background of each topic. Representative topics might include modernism, theatre, the essay, the regional novel, the novel of the Mexican Revolution, the modern novel, contemporary theatre, and contemporary poetry. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7320.

**SPAN 5400 (2-4). Seminar: Spanish Phonology.** Topics within Spanish phonology are treated, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics might include generative phonology applied to Spanish, Spanish phonology for college teaching, and different schools of Spanish phonology. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7400.

**SPAN 5410 (2-4). Seminar: Spanish Syntax.** Treats topics within Spanish syntax, each requiring a semester's study, as needs and resources dictate. Gives special attention to different schools and contemporary theoretical developments. Representative topics may include generative/transformational grammar applied to Spanish, fundamental problems in Spanish syntax, and different schools of Spanish syntax. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7410.

**SPAN 5420 (2-4). Seminar: History of the Spanish Language.** Treats topics within the history of the Spanish language, as needs and resources dictate. Concerned with linguistic evolution of Spanish from neo-Latin to its present status as a world language; considers important historic, linguistic, literary, and cultural currents. Representative topics might include a diachronic study of Spanish linguistic forms, the extension of Spanish to the New World, and linguistic and literary texts in Old Spanish. May be repeated up to 7 total credit hours. Prereq., graduate standing in SPAN or departmental consent. Same as SPAN 7420.20.

**SPAN 5430 (1-3). Seminar: Hispanic Linguistics.** Studies a major topic from an area such as phonology, syntax, history of the Spanish language, Hispanic linguistics and literature, or applied Hispanic linguistics. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7430.

**SPAN 5440-3. Seminar: Trends in Hispanic Linguistics.** Provides an overview of major trends and issues in Hispanic linguistics, including phonology, syntax, dialectology, sociolinguistics, discourse analysis, text linguistics, semiotics, history of the Spanish language, language acquisition, and applied linguistics. May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental consent. Same as SPAN 7440.

**SPAN 5450-3. Introduction to Hispanic Literature Linguistics.** Same as SPAN 4450.

**SPAN 5460-3. Topics in Spanish Applied Linguistics.** Treats topics within the scope of Spanish first and second language acquisition and the speech of bilinguals. Other topics include contrasting linguistics, interlingual stages of learning, and code switching as they relate to language acquisition. Prereq., graduate standing or instructor consent. Same as SPAN 7460.

**SPAN 5500-3. Seminar: Methods of Teaching Hispanic Literature and Cultures.** Same as SPAN 4500.

**SPAN 5650-3. Methods of Teaching Spanish.** Same as SPAN 4650.

**SPAN 6840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental approval.

**SPAN 6940 (1-3). Master's Degree Candidate.** Prereq., graduate standing in Spanish or departmental approval.

**SPAN 6950 (1-6). Master's Thesis.** Prereq., graduate standing in Spanish or departmental approval.

**SPAN 7120 (1-3). Seminar: Spanish Literature and/or Spanish American Literature.** Same as SPAN 5120.

**SPAN 7130 (1-3). Seminar: Critical Approaches to Hispanic Literature.** Same as SPAN 5130.

**SPAN 7140-3. Seminar: Spanish Literature, Medieval Period.** Same as SPAN 5140. May be repeated up to 6 total credit hours.

**SPAN 7200-3. Seminar: Spanish Literature, Renaissance and Baroque.** Same as SPAN 5200.

**SPAN 7210 (2-4). Seminar: Spanish Literature, 18th and/or 19th Centuries.** Same as SPAN 5210.

**SPAN 7220 (1-3). Seminar: Spanish Literature, 20th Century.** Same as SPAN 5220.

**SPAN 7300 (2-4). Seminar: Spanish American Literature, Colonial Period and/or 19th Century.** Same as SPAN 5300.

**SPAN 7320 (1-3). Seminar: 20th Century Spanish American Literature.** Same as SPAN 5320.

**SPAN 7400 (2-4). Seminar: Spanish Phonology.** Same as SPAN 5400.

**SPAN 7410 (2-4). Seminar: Spanish Syntax.** Same as SPAN 5410.

**SPAN 7420 (2-4). Seminar: History of the Spanish Language.** Same as SPAN 5420.

**SPAN 7430 (1-3). Seminar: Hispanic Linguistics.** Same as SPAN 5430.

**SPAN 7440-3. Seminar: Trends in Hispanic Linguistics.** Same as SPAN 5440.

**SPAN 7460-3. Topics in Spanish Language Acquisition and Applied Linguistics.** Same as SPAN 5460.

**SPAN 8840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., graduate standing in Spanish or departmental approval.

**SPAN 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section. Prereq., graduate standing in Spanish or departmental approval.

## Portuguese

**PORT 1010-5. Beginning Portuguese 1.** Offers students a firm command of Portuguese grammar. Uses grammar as point of departure for development of oral skills. Reading and writing stressed to lesser degree. Attendance at language laboratory may be mandatory.

**PORT 1020-5. Beginning Portuguese 2.** Continuation of PORT 1010. Prereq., PORT 1010 (min. grade C-) or placement.

**PORT 2110-3. Second-Year Portuguese 1.** Includes grammar review and a study of Portuguese and Brazilian culture, civilization, literature, and art. Prereq., PORT 1020 (min. grade C-) or placement. Meets MAPS requirement for foreign language.

**PORT 2120-3. Second-Year Portuguese 2.** Includes grammar review and a study of Portuguese and Brazilian culture, civilization, literature, and art. Prereq., PORT 2110 (min. grade C-) or placement.

**PORT 2350-3. Portuguese for Spanish Speakers.** Intensive introduction to the Portuguese language for those able to speak Spanish. Prereq., five semesters of college Spanish or equivalent, SPAN 3000, placement, or departmental approval.

**PORT 3220-3. Latin American Culture: Spanish America and Brazil.** Examines literary, artistic, and philosophical currents in Spanish America and Portuguese America (Brazil), from pre-Columbian times to the present. Taught in Spanish. Prereq., SPAN 3000. Recommended prereqs., PORT 2110 and 2120. Credit not granted for this course and SPAN 3210. Same as SPAN 3220.

**PORT 3230-3. Lusophone Cultures: Brazil, Portugal, and Lusophone Africa.** Examines literary, artistic and intellectual currents in Brazil, Portugal and Lusophone Africa from the 15th century period of Portuguese expansion to the post-colonial present. Taught in Portuguese. Prereqs., PORT 2110, 2120 and 2350 (min. grade C-) or departmental approval.

**PORT 4110-3. Survey of Brazilian Literature.** Examines major works of Brazilian literature. Prereqs., PORT 2120, 2350 and 3230 (min. grade C-) or equivalent. Same as PORT 5110.

**PORT 4150-3. Survey of Portuguese Literature.** Examines major works of Portuguese literature. Prereq., PORT 2120, 2350, and 3230 (min. grade C-) or equivalent. Same as PORT 5150.

**PORT 4230-3. Special Topics in Luso-Brazilian and/or African Literature.** Designed to examine intensively particular topics or issues concerning the literatures of Portugal, Brazil, and/or the African countries of Portuguese colonization. Taught in Spanish. May be repeated up to 6 total credit hours. Prereqs., PORT 3230, SPAN 3100, 3120, and an additional course above SPAN 3000. Same as SPAN 4230.

**PORT 4840 (1-3). Independent Study.** May be repeated up to 7 total credit hours. Prereq., departmental approval.

**PORT 5110-3. Survey of Brazilian Literature.** Same as PORT 4110.

**PORT 5150-3. Survey of Portuguese Literature.** Same as PORT 4150.

## Speech, Language, and Hearing Sciences

### Didactic: All-Department

**SLHS 1010-3. Disabilities in Contemporary American Society.** Addresses the issue that 50 percent of all individuals experience disability in their lifetime. Introduces students to the social, cultural, psychological, economic, political, legal, and health-care issues related to society and individuals with disabilities. Approved for arts and sciences core curriculum: contemporary societies or ideals and values.

**SLHS 2000-3. Introduction to Communication Disorders.** Surveys communication disorders, including hearing impairments, learning disabilities, and speech-language disorders, as well as an introduction to basic speech and hearing science.

**SLHS 2010-3. Science of Human Communication.** Discusses how human communication (the process by which a thought is transmitted from the brain of a speaker to the brain of a listener) involves a complex interaction of acoustics, anatomy, physiology, neurobiology, and psychology. Approved for arts and sciences core curriculum: natural science.

**SLHS 4000-3. Multicultural Aspects of Communication Differences and Disorders.** Examines perceptions and attitudes regarding differences in communication as a function of cultural-linguistic diversity. Discusses implications of differing verbal and nonverbal communication styles of various cultural groups in terms of professional responsibilities. Prereq., upper-division standing and a minimum of 60 credit hours.

**SLHS 4100 (1-3). Special Topics in Speech, Language, and Hearing Sciences.** Studies selected topics in speech, language, hearing sciences, communication disorders, and other professional issues.

**SLHS 4560-3. Language Development.** Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives. Prereqs. or coreqs., PSYC 1001, LING 2000. Same as LING 4560, PSYC 4560.

**SLHS 5000-2. SLHS Research Methods 1.** Familiarizes students with basic methodologies and research designs employed in the field. Focuses on critical reading of research papers and design of experiments. At least one research project is conducted and written as part of the course requirements. May be repeated up to 4 total credit hours.

**SLHS 5110-2. Clinical Theory and Practice.** Reviews models and theoretical perspectives regarding communication disorders with application to the clinical processes of assessment, intervention, counseling, and efficacy of intervention. Focuses on issues, challenges, and skills related to working with consumers of speech-language pathology and audiology services and their families, cultural competence, legal and ethical practices, teaming, and collaborative service delivery. Prereq., graduate standing.



**SLHS 5120-3. Foreign Language Learning in Students with Language Learning Disabilities.** Introduces a foundational knowledge of language based learning and processing problems that impact foreign language learning in students with disabilities. Must be accepted into the MFL certificate program.

**SLHS 5130-3. Curricular Accommodation Programs for Students with Foreign Language Learning Disabilities.** Provides knowledge about the legal bases for student accommodations for FL learning disabilities, the administrative procedures and policies surrounding accommodations, assessment, advising and related implementation issues. Must be accepted into the MFL certificate program.

**SLHS 5140-3. Accommodated Foreign Language Instructional Interventions for Students with Language Learning Disabilities.** Provides knowledge of the principles and skills used to develop modified foreign language instruction for students with language based learning disabilities. Must be accepted into the MFL certificate program.

**SLHS 6000 (1-4). Problems in Speech, Language and Hearing Sciences.** Studies selected topics related to the theory and management of communication disorders, and theoretical/scientific information related to speech, language, and hearing.

**SLHS 6650-3. Counseling and Professional Ethics.** Explores counseling theories and techniques following the diagnosis of a disability across the lifespan. Considers issues related to grieving and mourning, parenting, disability, cultural customs, attachment, and relationships. Covers professional ethics and ethical responsibilities.

**SLHS 6660-3. Multicultural Issues in SLHS and Communication Theory.** Provides an in-depth understanding and first-hand knowledge of different racial, ethnic and religious communities, which is necessary to develop and refine multicultural clinical competence. Incorporates scholarly readings and experiential learning in multicultural settings and fosters participants' qualitative research skills.

**SLHS 6940 (1-3). Candidate for Degree.**

**SLHS 6950 (1-7). Master's Thesis.**

**SLHS 7000-3. Research Designs in Human Communication Sciences and Disorders.** Offers an advanced seminar in research designs for human behavior: efficacy, ethnographic, single-subject, quasi-experimental, and experimental designs. Designed to familiarize students with terminologies and research designs frequently used in speech-language-hearing areas. Prereq., basic statistics.

**SLHS 7100-3. Cognitive Bases of Human Communication and Its Disorders.** Explores major cognitive theories related to language, including connectionism, information processing, and cognitive mechanisms of early lexical learning. Discusses data from children and adults.

**SLHS 7200-3. Business Aspects of Audiology.** Focuses on the business aspects of managing an audiology practice. Addresses developing a business plan, contracting for services, legal issues, financial reporting, budgeting, pricing, billing and reimbursement, regulatory issues, marketing, personnel management, risk abatement, and business ethics. Prereq., good standing in the SLHS graduate program or instructor consent.

**SLHS 7250-3. Research Methods in Language Development.** Covers advanced methods of conducting research in language development and acquired disorders. Students design a research project that includes elicitation tasks, transcription, and data coding and analysis. Explores child language data archives and computer-based analysis programs. Prereqs., LING/PSYC/SLHS 4560 or instructor consent. Same as LING 7250.

**SLHS 7450-3. Audiology Capstone Project.** Provides an individualized project for AUD, completed prior to initiation of final clinical year. May be in the form of research-based investigation, an evidence-based position paper, a clinical protocol based on peer-reviewed literature, a grant proposal, or another format approved by AUD committee. Project requires approved proposal by AUD committee and focused study supervised by capstone advisor. Restricted to students enrolled in the AUD graduate program.

**SLHS 8990 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements

for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Didactic: Speech-Language Pathology

**SLHS 4502-3. Language Disorders: Child and Adult.** Language disorders can result from problems with cognitive, linguistic, and/or discourse processing. The theoretical framework of language dysfunction is addressed while drawing upon real clinical examples of language disorders that have been observed in children and adults. Prereq., SLHS 4560.

**SLHS 4512-3. Speech Disorders: Voice, Cleft Palate, Motor Disorders, Stuttering.** Emphasizes stuttering, clefting, voice disorders, and motor disorders. Discusses research, evaluation, and treatment pertaining to each of these four disorder areas. Prereq., SLHS 3136.

**SLHS 5032-3. Competencies and Strategies for the SLPA.** Includes roles and responsibilities for the Speech Language Pathology Assistant (SLPA) working in the public schools, service delivery models, health and safety, screening assistive technology, intervention and self reflection and evaluation. Prereq., SLHS 4918. Must be accepted in the SLPA certification program.

**SLHS 5242-3. Language Disorders in School Age Children.** Addresses the nature, assessment, and treatment of developmental language disorders in school age children. Prereqs., graduate standing and undergraduate background in SLHS.

**SLHS 5252-3. Acquired Language Disorders in Adults.** Introduces the neural bases and medical etiologies of acquired language disorders in adults, explores the ways in which normal language processing may become disordered, and studies current methods of evaluation and treatment design. Prereqs., graduate standing and undergraduate SLHS background.

**SLHS 5262-3. Dysphagia.** Provides students with background in the anatomical, physiological, and neurological bases of swallowing function and disorders across the lifespan. Etiological factors are presented, as well as various assessment tools and principles of treatment of swallowing disorders in children and adults.

**SLHS 5272-3. Augmentative Alternative Communication: Theory and Use.** Provides an overview of the application of current technology to alternative/augmentative communication. Emphasizes assessment and intervention with nonverbal children and adults with need for alternative/augmentative communication systems. Presents various technological devices and systems. Addresses system selection, programming, development, and integration of use in environmental contexts. Prereq., SLHS 5232 and instructor consent.

**SLHS 5282-3. Acquired Cognitive Disorders.** Explores the theoretical and clinical management of acquired cognitive disorders that impact communication. Includes basic functional neuroanatomy. Prereq., graduate standing.

**SLHS 5292-3. Motor Speech Disorders.** Presents the neural bases of normal and disordered speech motor control, teaches assessment and treatment of motor speech disorders of children and adults, and applies motor control research to clinical problems. Prereqs., graduate standing and undergraduate SLHS background.

**SLHS 5302-3. Phonological Disorders.** Provides overview of phonological development, perception, and production. Presents factors related to articulation and focuses on critical evaluation of traditional and phonological based assessment and intervention procedures. Includes coverage of phonological awareness, metaphonological skills as related to literacy. Prereq., graduate standing.

**SLHS 5332-3. Cleft Palate and Voice Disorders.** Examines the anatomical and physiological bases for normal and disordered velopharyngeal and laryngeal function. Familiarizes students with evaluation and treatment of the speech of individuals with cleft lip and palate and laryngeal-based voice disorders.

**SLHS 5362-3. Stuttering: Therapy and Research.** Emphasizes evaluation and treatment of children and adults who stutter. Discusses and evaluates various stuttering intervention approaches. Also discusses counseling parents of young children who stutter. Familiarity with research is a secondary emphasis.

**SLHS 5602-3. Seminar: Intervention for Children with Communication Challenges: Birth to Six.** Provides an orientation to family-directed intervention in serving young children with disabilities and their families. Facilitates inte-

gration of medical, physiological, and theoretical perspectives with specific approaches to assessment and intervention.

**SLHS 5612-3. Learning Disabilities.** Focuses on the nature, assessment, and treatment of learning disabilities and their relation to language disorders. Prereq., SLHS 5242 or 5293.

**SLHS 5930-4. Speech Language Pathology Assistant Internship.** Placement for a minimum of 12 hours per week for a total of 180 hours including 100 direct student contact hours under the supervision of a fully credentialed SLP, to fully develop requisite skills as an SLPA and become employed in a public school setting. Prereq., SLHS 4918. Must be accepted into the SLPA certificate program.

## Didactic: Audiology

**SLHS 4704-3. Audiological Evaluation.** Studies basic principles and techniques of hearing evaluation, including pure-tone, speech, immittance, and advanced audiometry; hearing conservation in hospital, school, and industrial settings; and identification and evaluation of auditory pathologies. Required projects in screening and pure-tone audiometry. Prereq., SLHS 3136.

**SLHS 4714-3. Audiological Rehabilitation.** Covers basic principles and techniques related to the habilitation and rehabilitation of individuals who are deaf or hard of hearing: amplification, speech, language, auditory, speech reading, and educational issues. Prereq., SLHS 4704.

**SLHS 5674-3. Signals and Systems in Audiology.** Provides in-depth study of instrumentation used by audiologists for hearing aid evaluation and fitting, signal generation and modification, and signal measurement and calibration. Prereq., SLHS graduate standing.

**SLHS 6504-1. Professional Ethics in Audiology.** Overview of ethics and ethical issues in the profession of audiology. Topics to be discussed include code of ethics by professions, approaches to analyzing ethical dilemmas, ethics in relationships with manufacturers, and ethical considerations in teaching, clinical practice and research. Prereq., good standing in SLHS graduate program or instructor consent.

**SLHS 6514-1. Professional Issues in Audiology.** Overview of professional issues related to the profession of audiology. Topics to be discussed include certification, licensure, professional associations, infection control, practice management, federal regulations related to audiology, professional communications and professional relationships. Prereq., good standing in SLHS graduate program or instructor consent.

**SLHS 6544-3. Auditory Processes: Adult Assessment.** Advanced study on the current science surrounding hearing assessment of adults across the age span. Includes theoretical foundations and clinical applications.

**SLHS 6554-3. Auditory Processes: Child Assessment.** Provides advanced study in hearing assessment and management of children across the age span. Topics include epidemiological, medical, audiological, developmental, and rehabilitative aspects of normal and impaired hearing in children. Prereq., graduate standing and undergraduate audiology course work.

**SLHS 6564-3. Auditory Processes: Neurodiagnostics.** Provides advanced study in the neural bases of hearing. Includes theoretical foundations and clinical assessment of neurological functioning in auditory systems with both normal and impaired function. Prereq., SLHS 6544.

**SLHS 6614-3. Advanced Technologies in Amplification and Electroacoustics.** Discusses theoretical and clinical issues regarding the design, fitting, and evaluation of amplification technology for individuals with hearing loss. Includes the use of behavioral, psychological, electroacoustic, and physiological (real ear) measures in the selection and evaluation of digital and analog hearing aid technology.

**SLHS 6640-3. Communication Processes and Hearing Loss: School Age through Adult.** Theories and processes of the communication of individuals with hearing loss from the school age to adult population.

**SLHS 7520-3. Auditory Processes: Medical and Genetic Bases.** Discusses current developments in epidemiology, pathogenesis, and symptomatology of hearing loss. Investigates the genetic bases of hearing loss and deafness. Incorporates clinical decision theory in assessment and intervention. Explores

cross-disciplinary topics from genetics, radiology, pharmacology, pathology, and otology.

**SLHS 7530-3. Auditory Processes: Theory and Application in the School Environment.** Focuses on application of routine audiological practices such as screening, assessment, rehabilitation, and instrumentation to children in educational settings. Emphasizes federal education regulations and pertinent case law.

**SLHS 7540-3. Auditory Processes: Physiology, Assessment, and Management of the Vestibular System.** Emphasizes current research on physiology of the vestibular system, including both structure and function. Considers the etiology of both peripheral and central pathologies of the vestibular system. Discusses ways to assess function of the vestibular system as well as theoretical and practical considerations of vestibular rehabilitation.

**SLHS 7550-3. Auditory Processes: Environmental and Occupational Issues.** Discusses effects of noise and other damaging agents on the physiology of the auditory system. Highlights principles of hearing conservation programs. Focuses on prevention, identification, and management of occupational hearing loss and current legislation as it pertains to occupational safety and hazards.

**SLHS 7614-3. Implantable Devices: Technology and Clinical Application.** Examines technological aspects and clinical applications of implantable prostheses such as cochlear implants, brainstem implants, hybrid cochlear implants, BAHA devices and middle ear implants. Topics will include: history of implantable devices, anatomy and histopathology of the inner ear, speech processing in implants, mapping devices, candidacy criteria, behavioral and electrophysiologic techniques for assessment and outcomes in implanted children and adults. Prereq., good standing in SLHS graduate program or instructor consent.

**SLHS 7640-3. Communication Processes and Hearing Loss: Birth through Six.** Provides in-depth study of current research literature and its implications for clinical practice regarding development of communication processes in the first six years of life and impact of hearing loss. Investigates development of language, auditory perception, speech production, social-emotional abilities, and cognition.

## Didactic: American Sign Language

*Students will not receive credit for a lower level course in foreign language instruction taken after credit has been given for a higher level course in the same language sequence. For example, students will not receive credit for SLHS 2305 if it was taken after they passed SLHS 2315.*

**SLHS 2305-4. American Sign Language 1.** Introduces basic sign vocabulary, grammatical structures of ASL, and the culture of deaf people. Classes are taught using ASL without the use of spoken English.

**SLHS 2315-4. American Sign Language 2.** Develops more complex vocabulary and grammatical structures, and an understanding of deaf culture. Classes are taught using ASL without the use of spoken English. Prereq., SLHS 2305 or equivalent.

**SLHS 2325-4. American Sign Language 3.** Continuation of SLHS 2314. Covers ASL literature, advanced grammatical structures, idiomatic expressions, and deaf culture. Prereq., SLHS 2315 or equivalent. Meets MAPS requirement for a foreign language.

**SLHS 7035-3. The Development of American Sign Language.** Reviews the development of American Sign Language from the prelinguistic period to the time when a child is using complex syntax and morphology. Emphasis on a linguistic description of development and on research methodology. Prereq., SLHS 4035/5035.

**SLHS 7775 (1-2). Topics in Cognitive Science.** Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in ICS Cognitive Science Academic Programs. Same as LING 7775, CSCI 7772, EDUC 7775 and PSYC 7775.

## Didactic: Speech-Hearing Science

**SLHS 3006-3. Phonetics.** Focuses on production of speech sounds, transcribing speech using the International Phonetic Alphabet, analyzing the acoustic properties of speech sounds, understanding how speech sounds vary depending on the context. Provides a foundation for understanding normal and atypical speech development, atypical speech problems and patterns, regional and foreign accents, and speech recognition by computers.

**SLHS 3106-3. Hearing Science.** Focuses on the three main aspects of the hearing process: sounds in the environment (physical acoustics), sounds encoded within the auditory system (physiological acoustics), and perception of sound (psychological acoustics). Prereq., SLHS 2010.

**SLHS 3116-3. Speech Science.** Provides a basic understanding of the structural organization (anatomy), function (physiology), and neural controls of the structures used to produce speech, swallowing, respiration, and related behaviors in humans. Prereq., SLHS 2010.

**SLHS 5006-2. Applied Speech Science.** Provides an advanced understanding of the acoustics, aerodynamics, and biomechanics of speech production and related non-speech behaviors. Emphasizes the integration of theoretical constructs in the speech sciences with applied clinical and basic research. Prereq., SLHS 3136 or equivalent.

**SLHS 5576-3. Communication Neuroscience.** Provides an introduction to the neuroanatomy and neurophysiology of speech production and perception. Considers how speech and language are represented in, and controlled by, the central nervous system. Emphasizes the mechanisms underlying the communication process and discusses relevant neuropathologies.

**SLHS 6006-3. Advanced Hearing Science.** Provides advanced study in hearing science, including physical, physiological, and psychological acoustics of both normal and impaired auditory systems. Prereq., graduate standing in SLHS; undergraduate course work in biology or anatomy.

**SLHS 8206-3. Perception/Production Theories in Human Communication Sciences and Disorders.** Provides an advanced seminar in perception/production theories in human communication sciences and disorders. Familiarizes students with current perception theories related to the auditory/visual system and production theories related to the motor/auditory/visual system. Prereq., doctoral student standing or instructor consent.

## Practica

**SLHS 4918 (2). Introduction to Clinical Practice.** Introduces students to the clinical processes and key components of assessment and interventions. Explores the applications of the theoretical and scientific information to clinical settings. Students complete supervised observation of individuals with communication challenges. Restricted to juniors/seniors.

**SLHS 4938 (1-6). Internship: Speech-Language Intervention.** Provides a supervised clinical experience with children who have communication challenges enrolled in the Child Learning Center programs; individuals demonstrating communication disorders as a cotherapist in the Speech, Language, and Hearing Center; or off-campus experience in an affiliated hospital or public school program. May be repeated up to 6 total credit hours. Prereq., SLHS 4918 or instructor consent.

**SLHS 5848 (1-4). Independent Study.** May be repeated up to 7 total credit hours.

**SLHS 5878 (1-3). Practicum 1: Speech-Language-Learning Appraisal.** Provides a supervised clinical experience on campus in appraisal of speech, language, and learning disorders after training at the observational level. Prereq., SLHS graduate standing.

**SLHS 5898 (1-4). Practicum 1: Speech-Language-Learning Intervention.** Offers on-campus and off-campus supervised clinical practice in management of speech-language-hearing disorders in children and adults. May be repeated up to 6 total credit hours. Prereq., SLHS graduate standing.

**SLHS 5918 (1-3). Audiology Clinical Practicum.** Provides clinical training in the on site Speech, Language and Hearing Center in skills including audiology identification, evaluation and management for adults and children with hearing loss. May be repeated up to 16 total credit hours. Prereq., SLHS 6544.

**SLHS 5938 (1-3). Audiology Clinical Rotation.** Provides clinical training in an off campus Audiology facility in identification, evaluation and management

for adults and children with hearing loss. Schedule is variable with a minimum requirement of 16 hours on rotation per week. May be repeated up to 15 total credit hours. Prereqs., SLHS 5918, 6544, 6614, and instructor approval.

**SLHS 6918-7. Practicum 2: Speech-Language-Learning Internship.** Gives an off-campus experience in a clinical or hospital setting that provides in-depth practice in management of communication disorders of children and adults. May be repeated up to 10 total credit hours.

**SLHS 6928 (1-7). Practicum 2: Public School Internship.** Provides an off-campus supervised experience providing extended and in-depth practice involving school-age children in a school classroom. May be repeated up to 10 total credit hours.

**SLHS 6938 (1-10). Audiology Clinical Externship.** Provides students with full time off campus experience in an Audiology facility offering in-depth and advanced procedures for identification, evaluation and management of hearing loss in adults and children. May be repeated up to 21 total credit hours. Prereq., consent of department advisor.

**SLHS 7918-3. Practicum 3: Clinical Supervision.**

**SLHS 8918-3. Practicum 3: Classroom Instruction.**

**SLHS 8928-3. Practicum 3: Research Coordination.**

## Independent Study

**SLHS 4849 (1-4). Independent Study for Undergraduates.** May be repeated up to 7 total credit hours. Prereq., departmental consent.

**SLHS 5849 (1-4). Independent Study 1, MA.** May be repeated up to 7 total credit hours.

**SLHS 5859 (1-4). Independent Study 2, MA.** May be repeated up to 7 total credit hours.

**SLHS 7849 (1-4). Independent Study 1, PhD.** May be repeated up to 7 total credit hours.

**SLHS 7859 (1-4). Independent Study 2, PhD.** May be repeated up to 7 total credit hours.

## Theatre and Dance

### Theatre

#### *History/Dramaturgy/Directing*

**THTR 1011-3. Development of Theatre 1: Forms of Classical Theatre and Drama.** Examines the interaction of dramatic literature and performance in classical forms of European and Asian theatre, including Greek, Roman, Indian, Japanese, Medieval, and Renaissance European. Approved for arts and sciences core curriculum: literature and the arts.

**THTR 2021-3. Development of Theatre 2: Forms of Modern Theatre and Drama.** Examines the interaction of dramatic literature and performance in European theatre from 1800 to present, with attention to innovators like Ibsen, Strindberg, Stanislavsky, Meyerhold, Pirandello, Brecht, Beckett, and Churchill.

**THTR 3011-3. Development of the American Musical Theatre.** Studies the American musical theatre heritage and its relation to the continually changing social milieu. Examines productions, their creators, and performers. Prereq., junior or senior standing. Recommended prereq., 3 credits in THTR, DNCE, or MUSC. Approved for arts and sciences core curriculum: literature and the arts.

**THTR 3031-3. Development of Theatre 3: 20th Century International Drama.** Introduces 20th century international drama. Discusses selected plays by major African, Asian, and European authors and explores different dramatic traditions and their increasing interactions throughout the 20th century.

**THTR 4021-3. Development of Theatre 4: American Theatre and Drama.** Explores issues in American theatre and drama in the 19th through 21st centuries. Prereq., junior or senior standing and at least 12 hours of THTR course work. Similar to THTR 4001.

**THTR 4041-3. Women and Theatre of the 20th Century.** Explores a body of 20th century dramatic literature central to the study of women and theatre as well as the study of 20th century cultural history from a cross-national and multiracial feminist perspective. Major playwrights, particularly women from Asia, Africa, and Europe, are read and discussed. Recommended prereq., THTR 3031. Same as THTR 5041 and WMST 4041.

**THTR 4051-3. Playwriting.** Introductory course in craft of playwriting; primary focus on technique of developing short plays. Instructor consent required. May be repeated up to 6 total credit hours.

**THTR 4061-3. Directing.** Theory and practice of directing for the stage. Pre-reqs., THTR 1003 or 2003; THTR 1105 and 1115, and two semesters of THTR 3035.

**THTR 4081-3. Senior Seminar.** Intellectual and conceptual capstone course for departmental majors with separate sections for theatre and dance students. Course promotes integration of ideas regarding history, criticism, and theory in performance and production. All inquiry throughout the semester relates to the theme of creative process.

**THTR 4091-3. Elizabeth I and Her Times.** Interdisciplinary course explores different aspects of the reign of Elizabeth I: social and political history; literature; theater; and music. Explores the role and impact of a female ruler on English culture. Restricted to juniors and seniors. Same as ENGL 4583 and HIST 4134.

**THTR 5011-3. Seminar: Theory and Criticism.** Studies theories and criticisms of drama and theatrical performances from Plato to post-modernism.

**THTR 5031-3. Russian Theatre.** Studies Russian theatre history and the development of Russian drama from the 18th century to the present. Taught in translation.

**THTR 5041-3. Women and Theatre of the 20th Century.** Same as THTR 4041.

**THTR 5051-3. Special Topics in Theatre History.** Detailed study of a particular topic in theatre history (e.g., an era, a style, a country, or an organization). Topic specified in the online Schedule Planner. May be repeated up to 9 total credit hours on different topics.

**THTR 5061-3. Seminar: Asian Theatre.** Study of theatre and drama of India, China, and Japan: theatre history, production styles, and social functions of theatre. Background required in theatre, Asian studies, or both.

**THTR 5071-3. Perspectives on Directing.** Advanced study of theory and practice of stage directing through examination of the work of leading directors, analysis of texts, and classroom exercises. Prereq., previous directing course work and/or directing experience.

**THTR 6011-3. On-Stage Studies: Classical and Neoclassical Drama.** Studies classical and neoclassical drama in performance, with particular attention to 20th century productions and the critical and scholarly responses to these productions.

**THTR 6021-3. On-Stage Studies: English Renaissance Drama.** Studies Elizabethan and Jacobean dramatic texts as playscripts for performance, with particular attention to contemporary Shakespeare criticism and landmark Shakespeare productions over the last two centuries.

**THTR 6031-3. On-Stage Studies: American Theatre and Drama.** Studies American drama in performance, with particular attention to critical and scholarly responses to landmark productions of American classics.

**THTR 6041-3. On-Stage Studies: Modern European Drama.** Studies modern European drama in performance, with particular attention to critical and scholarly responses to landmark productions of modern classics.

**THTR 6051 (1-3). Production Research and Practicum: Directing.** Allows students to undertake a production project, normally within the major theatre season, that requires detailed preparatory research, testing of ideas, and public presentation. Students work under faculty supervision and prepare a documented written report and evaluation of the research, rehearsal, and performance process. Prereqs., advanced course work in directing and advisor approval.

**THTR 6071-3. Seminar: Perspectives on Acting.** Art of acting is examined through study of acting theories and practices developed during major periods of theatre history. Examines the variety of theories about acting that remain today.

**THTR 6081-3. Seminar in American Theatre: Lesbians and Gays.** Studies the portrayal of lesbians and gays in mainstream American theatre during the 20th and 21st centuries, as well as the contributions of gay and lesbian theatre artists during the same period.

**THTR 6091 (1-3). Production Research and Practicum: Dramaturgy.** Students undertake a dramaturgical project, normally within the major season, requiring detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision and prepare a documented written report of their project. Prereqs., advanced course work in dramatic literature and advisor approval.

### *Performance*

**THTR 1003-3. Acting for Nonmajors.** Teaches the basic principles of acting for those with no previous acting experience, focusing on relaxation, concentration, improvisation, use of imagination, actions, objectives, initial monologue and scene work, and basic terms and concepts of process work for the actor.

**THTR 2003-3. Acting 1.** Emphasizes principles of acting, focusing on exercises in relaxation, talking and listening, actions and objectives, and basic concepts of process work.

**THTR 2013-3. Performance of Literature.** Students learn to perceive literary form and content and to translate that perception into classroom performances of selected modern plays and stories. Performances, both solo and ensemble, embody literary texts diverse in terms of gender and ethnicity. Prereqs., 15 credit hours and THTR 1003, 2003 or 2043.

**THTR 2043-3. Voice and Movement for the Stage.** Natural resources of the human voice and body are studied as artistic resources for the performing artist. Designed to examine both the process and products of vocal and physical craft work.

**THTR 3013-3. Studio 1: Building a Character.** Students learn to deepen and develop their proficiency with specific acting techniques. Explores the craft elements of acting, as well as text analysis. Prereq., THTR 2003. Restricted to BFA program in acting or instructor consent.

**THTR 3023-3. Studio 2: Creating a Role.** Continued development of acting technique and tools for play analysis, with particular emphasis on scene study. Special attention will be given to the Master Teachers of Acting and their pedagogies. Prereq., THTR 3013 or instructor consent.

**THTR 3033 (1-3). Production Research and Practicum: Acting.** Allows students to undertake an acting project, either within the major season or approved departmental production. Requires detailed preparational research, rehearsal commitments, and public presentation of theories and concepts in practice. Following the performance, students present written reports and evaluations. May be repeated up to 3 total credit hours. Prereq., THTR 2003 or 2043.

**THTR 3043-3. Advanced Voice for the Stage.** Continues the work begun in THTR 2043. Studies advanced vocal techniques with the goal of integrating these skills into the working process of the performing artist. Prereqs., THTR 2043 or instructor consent.

**THTR 3053-3. Acting 2.** Continuation of the techniques introduced in the beginning acting courses (THTR 1003 and 2003). Emphasis is placed on monologues and scene study of contemporary plays. Basic techniques in developing a character are explored. Prereq., THTR 1003 or 2003.

**THTR 4013-3. Studio 3: Acting Shakespeare** In-depth study of Shakespearean texts from the perspective of their demands on the actor, including the conventions and performance styles of Elizabethan theatre. Prereqs., THTR 3013 and 3023, or instructor consent.

**THTR 4023-3. Studio 4: Playing with Styles.** Studies selected styles of theatre performance such as Greek Drama, Comedy of Manners, Commedia Dell'Art, Modern Realism, Theatre of Absurd, and Non-Western Theatre, including vocal and physical style elements. Prereq., THTR 3013, 3023, and 4013, or instructor consent.

**THTR 4033-3. Advanced Movement for the Stage.** Continues the work begun in THTR 2043. Studies the advanced physical techniques with the goal of integrating these skills into the working processes of the performing artist. Prereqs., THTR 2043 or instructor consent.

**THTR 4063-3. Audition Techniques.** Prepares students for the demands of the acting profession. Trains students in various audition techniques including general auditions, prepared auditions, cold readings, on-camera auditions, and commercial auditions. Shows how to prepare and perfect audition material in a professional and exemplary way. Discusses agents, casting directors, and the process of becoming a professional actor.

**THTR 4073-3. Performing Voices of Women.** Explores theories underlying the “feminine voice,” varied perspectives in prose and poetry, ways of embodying these voices and perspectives in performance forms, and ultimately the students’ own voices through creation of autobiographical performance pieces (some to be presented for student audiences). Open to both men and women. Prereq., instructor consent. Same as WMST 4073.

**THTR 4103-3. Acting for the Camera.** Introduces fundamental tools of acting for the camera. Students learn basic film terminology, specific camera acting techniques, and the demands placed on an actor when shooting a film. Uses exercises, scenes, monologues, and readings to provide a solid understanding of how to create a character, analyze a text, utilize important vocabulary, and perform effectively on camera. Prereq., THTR 1003 or 2003 or instructor consent.

**THTR 4193-3. Studio 5: Creating an Ensemble.** Students create an ensemble piece utilizing collaborative approaches. Emphasizes training actors in weaving personal, social, political, and cultural threads into an enactment. Prereqs., THTR 3013, 3023, 4013, 4023, or instructor consent.

**THTR 6003 (1-3). Production Research and Practicum: Acting.** Allows students to undertake an acting project, normally within the major theatre season, that requires detailed preparatory research, testing of ideas, and public presentation. Students work under faculty supervision and prepare a written report and evaluation of the research, rehearsal, and performance process. Prereqs., advanced studies in acting and advisor approval.

### *Theatre Design and Technology*

**THTR 1105-3. Stage Technologies.** Introduces technical production elements and procedures, including materials, organizations, methods and equipment to realize theatrical scenery, properties, lighting and sound. Credit not granted for this course and THTR 1065 or 1075.

**THTR 1115-3. Costume Technologies.** Introduces technical production elements and procedures including materials, organizations, methods and equipment to realize theatrical costuming and make-up. Restricted to declared THTR or DNCE majors, freshmen/sophomores, or advisor consent.

**THTR 2035-3. Design Fundamentals.** Introduces principles and techniques relevant to the expression of dramatic mood and idea through visual elements of the theatre, giving practice in concept development, style selection, and rendering techniques in scenery and costume design.

**THTR 3005-3. Costume Design 1.** Study and application of the principles of design as applied to stage costume, emphasizing texts in analysis and interpretation. Presented in a studio format and project driven. Explores concept development, style selection, and extensive practice in a variety of media and techniques for costume rendering. Prereq., THTR 1115 or instructor consent.

**THTR 3015-3. Scene Design 1.** Examines the process of theatrical scene design from early conception to realization. Course work is project-based. Students are introduced to the crafts of script analysis, conceptualization, design expression, drafting, and 3-D model building.

**THTR 3035 (1-2). Production Practicum.** Practical production projects within a designated area of technical theatre, design, stage management, normally related to the department’s season. May be repeated up to 8 total credit hours. Prereqs., THTR 1105 and 1115.

**THTR 3045-3. Stage Management.** Covers stage management from the inception of a production concept through the process of mounting a production, focusing on the interrelationships of the various artists involved, management and scheduling of time, and the psychology of handling a wide range of personalities. Prereq., THTR 1105 or instructor consent.

**THTR 3055-3. Stage Lighting Design 1.** Introduces the craft of stage lighting design through experimental lighting labs, lecture/demos, hands-on production experience, and theoretical projects. Subject matter includes aesthetics

of light, color theory, lighting for performance, design graphics, and basic lighting technology. Prereq., THTR 1105 or instructor consent.

**THTR 3075-3. Sound Design.** Study and application of the principles of sound technology and design, emphasizing concepts of electricity, acoustics, equipment, and their application to the stage. Prereq., THTR 1105 or instructor consent.

**THTR 3085-3. History of Western Fashion.** Surveys topics in western dress from ancient civilizations to contemporary time: the garments, accessories, materials, and technologies of personal adornment in the context of philosophical, political, social, and technological change. Priority given to majors. Replaces THTR 2085.

**THTR 4005-3. Costume Design 2.** Advanced studio course building on experiences and techniques studied in THTR 3005, with additional emphases on portfolio quality rendering technique and costume production technology as it affects and is affected by the designer. Prereq., THTR 3005.

**THTR 4015-3. Scene Design 2.** Advanced projects in theatrical scene design. Provides intensive practice in sketching, rendering, drafting and model-building. Emphasizes portfolio development and preparing the student designer for graduate training or professional work. Prereq., THTR 3015 or instructor consent.

**THTR 4025-3. Costume Patterning and Construction.** Includes techniques for the patterning and construction of contemporary and period costumes. Hands-on format covers techniques, materials, and equipment particular to theatrical production. Prereqs., THTR 1105 and 1115.

**THTR 4035-3. Scene Painting.** Introduces the craft of scene painting through practical projects. Sessions are in a studio format. Students are trained in traditional methods of scenic art, including layout, representational painting, trompe l’oeil, faux finishing, and related skills. Students are taught about proper tool use and care, paint products, and the profession.

**THTR 4055-3. Stage Lighting Design 2.** Assumes a basic knowledge of stage lighting; concentrates on advanced technology, processes, and design projects. Prereq., THTR 3055.

**THTR 4085-3. Theatre Management.** Concentrates on theory and practice of management aspects of the performing arts, emphasizing theatre and dance. Includes marketing, budgeting, house and stage management, audience development, grant writing, unions, and season development. Includes practical experience. Prereqs., THTR 1105 and 1115. Credit not granted for this course and THTR 3065. Same as THTR 5085.

**THTR 4095 (1-3). Special Topics in Theatre Design and Technology.** Intensive study of specialized topics in theatre technology and design. Topics and credits specified in the online Schedule Planner. May be repeated up to 12 total credit hours within a term.

**THTR 4135-3. Technical Production.** Examines the process of and technology for producing theatrical scenery on a limited production timeline. Prereq., THTR 3035. Recommended prereq., THTR 3015 or 3055.

**THTR 4145-3. Colloquium in Advanced Design.** An advanced theatre design course that emphasizes the collaborative process and advanced design presentation methods. Course work includes completion of several “mock” design projects, with students often working in collaborative teams.

**THTR 4555 (1-2). Production Studio.** Requires participation in a Theatre department production assignment in the areas of design, technology, or management, as well as participation in a semester portfolio review. May be repeated up to 6 total credit hours. Restricted to TBFA majors. Credit not granted for this course and THTR 4065 or 4075.

**THTR 5085-3. Theatre Management.** Same as THTR 4085.

**THTR 6005 (1-3). Production Research and Practicum: Designing.** Allows students to undertake a design project, normally within the theatre season, that requires detailed preparatory research, testing of ideas, and public presentation of theories and concepts in practice. Students work under faculty supervision, and prepare a documented written report and evaluation of the research, design, and realization process, as well as fully rendered designs and/or plots. Projects may be in costumes, lights, or scenery.

## Shakespearean Production

*Offered in summer only.*

**THTR 3037 (2-3). Shakespeare Practicum.** Students are assigned to work with production artisans of the Colorado Shakespeare Festival. While there are many possible areas, production designs for each season determine the number of available positions. May substitute for two credits of THTR 3035. Prereq., THTR 1105 or 1115.

**THTR 4047-3. Shakespeare Behind the Scenes.** Detailed study of script analysis, directing concepts, staging and criticism of the plays being produced by the Colorado Shakespeare Festival.

**THTR 6007-3. Colorado Shakespeare Festival Dramaturgy.** Students work as production dramaturgs for the Colorado Shakespeare Festival, developing detailed textual, historical, and critical research for CSF productions, participating in education and outreach programs, and writing production-related articles for publication. May be repeated up to 6 total credit hours.

### Special Courses in Theatre

**THTR 1009-3. Introduction to Theatre.** Introduces the varieties of theatrical art, past and present, contributions of the various theatrical artists to the total production, and the place of theatre art in today's society. Designed for nonmajors. Approved for arts and sciences core curriculum: literature and the arts.

**THTR 1019-3. Theatre Foundations: Text Analysis and Practice for the Theatre Arts.** Introduces fundamental methods of text analysis for the stage, presents common vocabulary and concepts of the theatre event as an art form and how it works, and what playmaking means to those who do it. Restricted to freshman/sophomore THTR/TBFA majors.

**THTR 2059-3. Open Topics in Theatre and Drama.** Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the online schedule planner.

**THTR 2849 (1-3). Independent Study.** May be repeated up to 3 total credit hours.

**THTR 3849 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**THTR 4009 (1-3). Strategies of Teaching Theatre.** Specifically designed for teachers at the elementary, middle school, and secondary levels. Focuses on developing effective, innovative performance-based strategies for teaching theatre.

**THTR 4029 (1-12). CU-Boulder Touring Company.** Participation in departmental touring dance company. By audition. May be repeated up to 12 total credit hours. Prereqs., DNCE 2021, 3041, or 4061. Restricted to sophomores/juniors/seniors. Full-year course; consecutive fall and spring semester required.

**THTR 4039-3. Musical Theatre Repertory.** Developed around the learning of complete scenes, songs, and dances that are representative of the major periods and styles within musical comedy from the 1920s to the present. Emphasizes in-class performance. Admission by audition. Same as THTR 5039.

**THTR 4049 (1-4). Problems in Theatre.** Opportunity for students to explore, upon consultation with the instructor, areas in theatre that the normal sequence of offerings may not allow. May be repeated up to 9 total credit hours. Same as THTR 5049.

**THTR 4059-3. Open Topics in Theatre and Drama.** Covers topics not otherwise listed in the curriculum. Topics for each semester are specified in the online Schedule Planner. May be repeated up to 9 total credit hours.

**THTR 4149 (1-3). Theatre Internship.** Provides opportunities for theatre majors to explore career opportunities in theatre fields other than, or in addition to, those with performance emphasis. Students apply knowledge and skills developed in their major studies to a practical work experience. May be repeated up to 6 total credit hours. Prereq., 30 credit hours in THTR.

**THTR 4849 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**THTR 5039-3. Musical Theatre Repertory.** Same as THTR 4039.

**THTR 5049 (1-4). Problems in Theatre.** Same as THTR 4049.

**THTR 5849 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**THTR 6009-1. Research Strategies and Techniques.** Examines research methodologies appropriate to the performing arts, particularly theatre and dance. Projects are aimed at familiarizing graduate students with the library and other resources, and the development of thesis and dissertation prospectuses. Same as DNCE 6009.

**THTR 6019-3. Professional Orientation.** Prepares doctoral students in theatre to write for publication and to understand the intricacies of the publishing world. The course also explores grant writing, theatre pedagogy, evaluating efficacy of projects and programs, and culminates in the creation of a portfolio to be drawn from when applying for jobs.

**THTR 6849 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**THTR 6949 (1-6). Master's Candidate.**

**THTR 6959 (1-6). Master's Thesis.** May be repeated up to 6 total credit hours.

**THTR 8999 (1-10). Doctoral Dissertation.** All doctoral students must register for not fewer than 30 hours of dissertation credit as part of the requirements for the degree. For a detailed discussion of doctoral dissertation credit, refer to the Graduate School section.

## Dance

### Nonmajor Technique

**DNCE 1000-2. Beginning Modern Dance.** Introduces basic concepts and skills of modern dance. In-class technique work develops muscle strength, flexibility, coordination, rhythm, and dynamic and spatial awareness. Lecture/discussions focus on various aspects of modern dance including history, composition, kinesiology, and criticism. Limited amount of written work is required. May be repeated up to 4 credit hours.

**DNCE 1020-1. Beginning Modern Dance with Experience.** Studio course that continues the work from the beginning level on basic concepts and skills in modern dance technique to increase strength, flexibility, and coordination. May be repeated up to 2 total credit hours. Prereq., DNCE 1000.

**DNCE 1100-1. Beginning Ballet.** Ballet for beginners; no previous experience required. Stretching, basic barre, simple terre a terre, and jumping steps are learned, as well as alignment and basic extended positions such as arabesque and attitude. Mastery of simple enchainements and rhythmic patterns. May be repeated up to 2 total credit hours.

**DNCE 1120-1. Beginning Ballet with Experience.** Extension of beginning ballet, when basic concepts of ballet have been mastered. Enchainements are of greater complication and variety. Dance vocabulary is more extensive. Pirouettes and more complex musical phrases are expected. May be repeated up to 2 total credit hours. Prereq., DNCE 1100.

**DNCE 1190-1. Ballet 1.** Beginning ballet covering the basic vocabulary of classical ballet technique. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 1200-1. Beginning Jazz Dance.** Introduces various styles of movement unique to jazz dance. Students learn fundamental technical dance skills as well as specific jazz vocabulary. Designed for students with little or no dance experience. May be repeated up to 2 total credit hours.

**DNCE 1220-1. Beginning Jazz with Experience.** Further develops work begun in Beginning Jazz. Exercises and jazz dance phrases are more complex. May be repeated up to 2 total credit hours. Prereq., DNCE 1200.

**DNCE 1290-1. Jazz 1.** Introduces jazz dance, consisting of a technique warm-up, locomotion across the floor, and a series of dance phrases developed into a short dance combination. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 2290-1. Jazz 2.** Continuation of Jazz 1. Studies coordination, rhythm, style, and advanced body part isolation in depth. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 3040-2. Intermediate/Advanced Modern Dance.** See DNCE 1020. More in-depth study of modern dance concepts. Class technique work more advanced. May be repeated up to 4 total credit hours. Prereq., DNCE 1000 or 1020. Formerly DNCE 2040.

## Major Technique

The following dance courses are designed for dance majors. Enrollment by audition or instructor consent.

**DNCE 1091-1. Modern 1.** Introduces basic skills of modern dance. In-class technique work increases muscle strength, flexibility, and coordination. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 1901 (1-3). Technique Practicum.** Offers special courses in the technique series. Includes world dance and/or social dance forms. May be repeated up to 6 total credit hours.

**DNCE 2021-2. Major Technique.** Enrollment by audition only. May be repeated up to 16 total credit hours.

**DNCE 2091-1. Modern 2.** Continuation of Modern 1. A developmental sequence of modern dance technique designed to refine the technical/expressive skills required of the professional dancer. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 2101-1. Pointe.** Addresses the basic training for the art of dancing "sur les pointes." Students will learn how to prepare technically, how to take care of the foot and ankle, and will be encouraged to address their personal alignment issues. A historical survey of the development of the pointe technique from the Romantic Age to the present will be discussed and students will be encouraged to attend local ballet performances and/or watch videos of works of both classical and contemporary ballets. May be repeated up to 4 total credit hours. Recommended prereqs., DNCE 3161 or DNCE 4181.

**DNCE 2141-1. Low Intermediate Ballet.** All basic ballet steps should have been mastered, including pirouettes en d'hors and en dedans, knowledge of the principles and placement, and the ability to master simple enchainements. May be repeated up to 2 total credit hours. Prereq., DNCE 1120.

**DNCE 2191-1. Ballet 2.** Intermediate ballet, covering the complete vocabulary of classical ballet technique. Enchainements are of complex structure. Offered summers only at Perry-Mansfield Performing Arts Camp. May be repeated up to 2 total credit hours.

**DNCE 2501-2. African Dance.** Explores the technique, style, and rhythms of various African, Caribbean, and dance forms of the Americas. Music, history, anthropology, and folklore help to enhance the dance and provide a cultural experience. May be repeated up to 6 total credit hours within a term. Same as ETHN 2502.

**DNCE 2701-2. Contact Improvisation 1.** Contact Improvisation is the practice of spontaneously generating movement guided by moment-to-moment physical contact and sharing of weight between two or more dancers. Fundamental skills of contact improvisation will be introduced; rolling, falling, giving and taking weight, use of momentum, and gravity. Skills are developed in both duets and larger groups. Similar to DNCE 4013.

**DNCE 2901 (1-3). Technique Practicum 2.** Offers second level classes in the world dance forms technique series. Topics or forms of dance include world dance forms and/or social dance forms. May be repeated up to 6 total credit hours.

**DNCE 3041-2. Major Technique.** Designed for dance majors. Enrollment by audition only. May be repeated up to 16 total credit hours.

**DNCE 3101 (1-3). Ballet Practicum.** Practical studio training in ballet at the advanced/professional level with a professional company. May be repeated up to 4 total credit hours. Prereq., DNCE 2141, 3161, or 4181. Designed for dance majors. Enrollment by audition only.

**DNCE 3161-1. Intermediate Ballet.** Covers the general vocabulary of classical ballet technique and enchainements of medium complexity. Multiple pirouettes in all positions are required. Audition required. May be repeated up to 8 total credit hours.

**DNCE 3241-1. Intermediate Jazz.** Designed for the experienced jazz dancer. Includes dance techniques that further improve alignment, strength, flexibility, and coordination within the jazz idiom. Greater emphasis on style and rhythm and challenging dance combinations. May be repeated up to 2 total credit hours. Prereqs., DNCE 1200 and 1220. Formerly DNCE 2241.

**DNCE 3601-2. Alexander Technique for Actors and Dancers.** The Alexander Technique is a method for changing habits that impede the performance of movement and speech. Through class discussions, movement exploration, and individualized hands-on lessons, actors and dancers gain understanding of the technique and its benefits to performance. Restricted to theatre and dance majors.

**DNCE 3901 (1-3). Technique Practicum.** Offers special courses in the technique series. Topics or forms of dance will include world dance forms and/or social dance forms. May be repeated up to 6 total credit hours. Instructor consent required.

**DNCE 4061-2. Major Technique.** Designed for dance majors. Enrollment by audition only. May be repeated up to 16 total credit hours.

**DNCE 4181-1. Advanced Ballet.** Advanced classical ballet, covering the complete vocabulary. Enchainements are of complex structure. Audition is required. May be repeated up to 8 total credit hours.

**DNCE 4261-1. Advanced Jazz Dance Technique.** Opportunity for advanced dancers who want to expand their technical skills in the jazz form. Each class includes a standing warm up, floor work for strength and flexibility, adagio combination for line and balance, and a locomotor combination for turns, leaps, rhythm, and fast footwork. Emphasis is placed on technique, musicality, style, and performance. May be repeated up to 4 total credit hours. Same as DNCE 5261.

**DNCE 4701-2. Contact Improvisation 2.** Build upon skills introduced in Beginning Contact Improvisation as we explore the creative possibilities of interacting with the weight of a partner. Emphasis will be placed upon ease and efficiency in partnering, and integrating this work into choreography and performance. Prereq., DNCE 2701. Same as DNCE 5701.

**DNCE 5001-2. Graduate Technique.** Open only to graduate dance majors. May be repeated up to 12 total credit hours. Restricted to graduate students.

**DNCE 5101-1. Intermediate Graduate Ballet.** Open only to graduate dance majors. May be repeated up to 6 total credit hours. Restricted to graduate students.

**DNCE 5261-1. Advanced Jazz Dance Technique.** Same as DNCE 4261.

**DNCE 5601-2. Alexander Technique for Graduate Students.** Learn the principles of the Alexander Technique through class discussions, movement exploration, and individualized hands-on-lessons. Discover how to improve their overall functioning and learn to apply the technique to performance and teaching.

**DNCE 5701-2. Contact Improvisation 2.** Same as DNCE 4701.

**DNCE 5901 (1-3). Graduate Technique Practicum.** Offers special topics and styles in the graduate technique curriculum. Rotating foci include a variety of traditional dance forms from around the world as well as vernacular, recreational, and social dance phenomena indigenous to the US. Course meets simultaneously with an undergraduate studio course, and includes both the practical movement experience and scholarly study of specially-chosen issues in dance. May be repeated up to 6 total credit hours.

**DNCE 6101-1. Advanced Graduate Ballet.** Open only to graduate dance majors. May be repeated up to 6 total credit hours. Restricted to graduate students.

## Production

**DNCE 1012-2. Dance Production 1.** Provides the dancer with an introduction to the types of performance venues available today, and their technical systems and equipment. It will also establish an awareness of how technical theatre design arts may be utilized by a choreographer. Restricted to dance majors. Credit not granted for this course and DNCE 2012.

**DNCE 3022-2. Dance Production 2.** Establishes awareness of supporting technical theatre arts available to the choreographer; provides practical hands-on introduction to systems and equipment; and provides vocabulary with which the choreographer communicates with designers and technicians. Prereq., DNCE 1012 and THTR 1115. Restricted to DNCE majors. Credit not granted for this course and DNCE 2022.

**DNCE 4012-1. Concert Production.** Provides practical experience in producing formal and informal dance concerts. Introduces basic familiarity with production and promotional responsibilities, and backstage and front-of-house

duties and procedures. Prereq., DNCE 1012 or equivalent. Restricted to DNCE and DBFA majors. Same as DNCE 5012.

**DNCE 5012-1. Concert Production.** Same as DNCE 4012.

**DNCE 5052 (1-3). Studio Concert.** Restricted to dance majors with 87 credit hours or more.

### *Creative Process*

**DNCE 1013-2. Dance Improvisation.** An opportunity for students to develop skills of dance improvisation through the exploration of structured movement problems. Students study selected contemporary dance artists whose work stresses improvisation in performance and/or as a training vehicle. Restricted to dance majors. Formerly DNCE 2013.

**DNCE 2033-3. Beginning Composition.** Introduces the basic elements of dance composition through compositional studies evolved from readings, discussion, and improvisation. Prereq., DNCE 1013 and DNCE 2021, 3041, or 4061. Restricted to DNCE majors.

**DNCE 3043-3. Intermediate Dance Composition.** Opportunity for students to increase knowledge and understanding of dance composition elements as they relate to group forms, theme, development, and phrase manipulation. Prereqs., DNCE 2033 and DNCE 2021, 3041, or 4061. Restricted to dance majors.

**DNCE 4023-2. Performance Improvisation Techniques.** Explores movement and vocal improvisational techniques to enhance creative and performance skills. Helps individuals discover and make accessible the diversity of the human instrument and develops practical tools to broaden expressive range. Same as DNCE 5023. Formerly DNCE 4018.

**DNCE 4053-3. Advanced Dance Composition.** In-depth approach to composition emphasizing personal invention, solo and group forms; styles based on historical art forms; exploration of the evaluative process. Prereqs., DNCE 3043 and DNCE 2021, 3041, or 4061. Restricted to dance majors. Same as DNCE 5053.

**DNCE 5023-2. Performance Improvisation Techniques.** Restricted to graduate students. Same as DNCE 4018 with the addition of written analysis and creative assignments. Formerly DNCE 5018.

**DNCE 5053-3. Advanced Dance Composition.** Same as DNCE 4053. Restricted to graduate students in dance.

**DNCE 6073-3. Choreography.** Covers in-depth practical and theoretical approaches to dance composition for graduate students; solo and group forms; and analysis of historical and contemporary dance works. May be repeated up to 6 total credit hours with different instructors. Restricted to graduate students in dance.

### *Music*

**DNCE 2014-2. Rhythmic Analysis and Accompaniment.** Emphasizes elements of rhythm in relation to dance. Experiences with rhythmic drills, rhythmic notation, and percussion accompaniment for the modern dance class comprise the body of the course. Restricted to dance majors.

**DNCE 3024-2. Musical Resources for Dance.** Surveys basic musical notation and terminology, elements and forms of music, and historical styles, supported by guided listening to representative works within western musical tradition. Special emphasis on 20th century techniques and on the relationship of various music to dance. Prereq., DNCE 2014. Restricted to dance majors.

**DNCE 5064-3. Music and Dance Seminar: Collaboration.** Investigates selected aspects of rhythm, accompaniment, and musical resources for dance and applications to performance, choreography, and teaching. Topics may include movement analysis and rhythmic clarity, self-accompaniment, working with accompanist/composers, relationship of music to dance, and survey of 20th century compositional techniques. Prereq., dance/music experience, or instructor consent. Restricted to graduate students in dance.

### *Movement Analysis*

**DNCE 2005-3. Movement Awareness and Injury Prevention for the Dancer.** Helps dancers understand the prevention and care of common injuries associated with their art. Through various somatic methods, anatomy, and kinesiology, students learn to reduce tension, improve body usage, and enhance

their performance. Prereqs., DNCE 2021, 3041, or 4061. Restricted to dance majors.

**DNCE 4015-3. Movement Analysis.** Introduces Rudolf Laban's theories of movement and exposes several body therapies to heighten students' awareness of movement as a multifaceted (neuromuscular/spatial/dynamic) event. Emphasizes refinement of movement, observation skills, and improvement of performance. Prereq., DNCE 2005. Restricted to dance majors. Same as DNCE 5015.

**DNCE 5015-3. Movement Analysis.** Restricted to graduate students. Same as DNCE 4015.

### *Pedagogy*

**DNCE 4016-3. Creative Dance for Children.** Methods course for prospective teachers of creative dance for children. Lectures, readings, and laboratory experiences are followed by observation and teaching in primary grades. Prereqs., DNCE 1013 and 2033. Restricted to dance majors. Same as DNCE 5016.

**DNCE 4036-3. Methods of Teaching Dance.** Practical experience in teaching modern dance to the young adult follows theoretical grounding in specific teaching methods. Examines values and goals of dance in education and fundamental movement principles as related to the teaching of technique and improvisation. Prereqs., DNCE 1013 and 2033. Restricted to dance majors. Same as DNCE 5036.

**DNCE 5016-3. Creative Dance for Children.** Restricted to graduate students. Same as DNCE 4016 with addition of readings and a paper.

**DNCE 5036-3. Methods of Teaching Dance.** Restricted to graduate students in dance. Same as DNCE 4036 with addition of readings and a paper.

**DNCE 6016-2. Teaching Lab: Modern Dance.** Provides opportunity to apply principles and skills introduced in DNCE 5036. Participating students share the responsibility for teaching a lab class that meets twice a week. Focuses on analysis and evaluation of teaching skills. Restricted to graduate students.

**DNCE 6056-2. Professional Development.** Examines current trends, issues, and problems of dance at colleges, in secondary education, in the community, and in professional dance. Explores curriculum development and educational dance trends along with other topics such as freelance work, grant writing, and dance advocacy. Restricted to graduate students in dance.

### *Dance and Cultural Studies*

**DNCE 1027-3. Introduction to Dance and Culture.** Explores Dance's relationship to broad cultural realities such as food getting, sexuality, rites of passage, work, and religion. Topics are explored by looking at several different cultural groups and how their dance functions in relation to the specific topic. (For example, dance as a function of religion could be studied through explorations into Afro-Cuban orisha dances, Bharata Natyam, and Hopi Ghost dancing.) Formerly DNCE 1029. Approved for arts and sciences core curriculum: literature and the arts.

**DNCE 3027-3. Looking at Dance.** Focuses on the development of perceptual, descriptive, and analytical skills as well as the ability to apply cultural and critical theory to 20th and 21st century concert dance. Specific pieces of choreography are looked at from a broad range of perspectives. Formerly DNCE 3029. Approved for arts and sciences core curriculum: literature and the arts.

**DNCE 4017-3. History and Philosophy of Dance.** Follows the specific history and narrative of some dance forms (including African, Ballet, American social dance, Jazz, and Modern) and traces their development over time. Gives attention to the effect of social, political, economic, and environmental conditions as well as the influence of other dance forms and the impact of specific dance artists and teacher. Restricted to juniors and seniors. Same as DNCE 5017. Approved for arts and sciences core curriculum: literature and the arts.

**DNCE 5017-3. History and Philosophy of Dance.** Restricted to graduate students. Same as DNCE 4017 with addition of graduate papers and/or a project.

**DNCE 6017-3. Readings in Dance.** Surveys dance literature including an opportunity for graduate students to familiarize themselves with resources, current publications, theoretical materials, and professional organizations in dance. Restricted to graduate students in dance. Formerly DNCE 6019.



**DNCE 6047-3. Seminar: Dance.** Intensive study of selected topics related to the art of dance, dance criticism, dance aesthetics, and dance in relationship to historical, social, and cultural environments with an emphasis on contemporary American forms and their roots. Restricted to graduate students in dance.

### *Performance*

**DNCE 1908-1. Performance Practicum.** Students learn and perform a dance choreographed by a faculty member or graduate student for an informal and/or formal presentation. May be repeated up to 3 total credit hours.

**DNCE 2098-1. Performance/Repertory.** Students learn and perform dances from the repertory of guest artists. Offered summers only. May be repeated up to 3 total credit hours.

**DNCE 4038 (1-3). Dance Repertory.** Learning and performing dances from the repertory of current faculty members, artists-in-residence, and upon occasion from the repertory of historic modern dancers. Dance majors may repeat up to 9 total credit hours with different instructors. Enrollment by audition only. Same as DNCE 5038.

**DNCE 4128-1. Pointe and Variation.** For the more advanced classical ballet student. Entails working on pointe and learning dances from Classical, Romantic, and Neo-Classical ballets. Enrollment by audition only. May be repeated up to 2 total credit hours. Same as DNCE 5128.

**DNCE 5038 (1-3). Dance Repertory.** Same as DNCE 4038 except graduate students are required to keep a log of the learning process involved in repertory to document and analyze each work in terms of stylistic differences, musical/sound accompaniment and trends. Dance majors may repeat up to 9 total credit hours with different instructors. Enrollment by audition only. Restricted to graduate students.

**DNCE 5048 (1-4). Touring Dance Ensemble.** May be repeated up to 8 total credit hours.

**DNCE 5128-1. Pointe and Variation.** By audition only. Students should have previous experience. Restricted to graduate students. May be repeated up to 2 total credit hours. Same as DNCE 4128.

### *Independent Study*

**DNCE 1849 (1-3). Independent Study.** Involves creative or scholarly investigation of an area of interest to the student not addressed in the curriculum. Work must be arranged with and advised by a faculty member. Freshman level course. May be repeated up to 7 total credit hours. Same as DNCE 2849, 3849, 4849, 5849.

**DNCE 2849 (1-3). Independent Study.** Same as DNCE 1849, at the sophomore level.

**DNCE 2909 (1-4). Problems in Dance.** Explores topics and research in relation to areas such as technology, environment, teaching methods, performance, world dance, arts in society, and/or criticism that the normal sequence of offerings may not allow. May be repeated up to 7 total credit hours. Same as DNCE 4909 and 5909 at the sophomore level.

**DNCE 3849 (1-3). Independent Study.** Same as DNCE 1849, at the junior level.

**DNCE 4849 (1-3). Independent Study.** Same as DNCE 1849, at the senior level.

**DNCE 4909 (1-4). Problems in Dance.** Same as DNCE 2909 and 5909.

**DNCE 4919 (1-3). Dance Practicum.** Project in dance under supervision of senior faculty. May be repeated up to 3 total credit hours. Same as DNCE 5919.

**DNCE 4939 (1-3). Dance Internship.** Provides an opportunity for upper-division dance majors to serve apprenticeships in the community in work areas related to their major interests and career goals. Internships are available in areas such as arts administration, dance therapy, and technical production. Prereqs., 30 credit hours in dance.

**DNCE 5849 (1-3). Independent Study.** Same as DNCE 1849, at the graduate level.

**DNCE 5909 (1-4). Problems in Dance.** Same as DNCE 2909 and 4909.

**DNCE 5919 (1-3). Dance Practicum.** Same as DNCE 4919.

**DNCE 6009-1. Research Strategies and Techniques.** Restricted to graduate students. Same as THTR 6009.

**DNCE 6919 (1-3). Directed Studies.** Explores advanced topics in dance not regularly covered in the curriculum of the graduate program. May be repeated up to 6 total credit hours. Restricted to graduate students.

**DNCE 6949 (1-4). Candidate for Degree.**

**DNCE 6959 (1-4). Master's Thesis.**

**DNCE 6969 (3-6). The Graduate Project.** Provides the opportunity for synthesizing the graduate experience through the execution of a project related to the student's major area of interest. Project must be approved by the graduate faculty advisor.

## **Western American Studies**

**CAMW 2001-3. The American West.** Students tour the cultural, social, and natural features of the American West, based on readings and presentations by guest faculty from across disciplines. Designed as the foundation course in the Western American Studies certificate program. Approved for arts and sciences core curriculum: United States context.

**CAMW 3939 (1-3). Center of the American West Internship.** Work for public and private organizations on projects that enhance the understanding of various Western American topics and issues (environmental, cultural, public policy, etc.), and which foster students' development as community leaders working for a sustainable West. May be repeated up to 6 total credit hours. Recommended prereq., CAMW 2001. Restricted to juniors and seniors.

**CAMW 4001-3. Seminar on the American West.** Interdisciplinary capstone seminar for the Western American Studies certificate program. Applies a selected natural science, social science, or humanities topic to the American West and addresses how westerners can make and sustain viable landscapes and communities. Recommended prereqs., CAMW 2001 and completion of Western American Studies certificate electives.

**CAMW 4840 (1-4). Independent Study: The American West.** Recommended prereq., CAMW 2001, junior or senior standing.

## **Western Civilization Studies**

**CWCV 2000-3. The Western Tradition.** Encourages a historical and critical investigation of the formative influences on what is often called Western culture, including religious, political, social and economic factors, and contemporary interpretations and critiques of these developments and concepts. Designed as foundation course for the Center for Western Civilization. Approved for arts and sciences core curriculum: ideals and values.

## **Women and Gender Studies**

**WMST 2000-3. Introduction to Feminist Studies.** Introduces students to the field of Women and Gender Studies. Examines gender issues in the United States from interdisciplinary, multicultural, and feminist perspectives. Covers such topics as sexuality, beauty ideals, women's health, violence against women, work, the economy, peace and war, and the environment. Meets MAPS requirement for social science: general. Approved for arts and sciences core curriculum: human diversity.

**WMST 2020-3. Social Construction of Femininities and Masculinities.** Examines the impact of race, ethnicity, social class, and sexual orientation on the social construction of femininities and masculinities. Studies key issues as they arise over the course of the life cycle, e.g., sexual identity, work/family conflicts, violence, dating, and relationships, etc. Approved for arts and sciences core curriculum: human diversity.

**WMST 2050-3. Gender and Contemporary Culture.** Explores the debates relating to culture, its gendered effects and its relationship to race, class, location and sexuality, and how these relate to gender considerations in the family, workplace, the media, sports, cyberspace and other institutions. Approved for arts and sciences core curriculum: human diversity.

**WMST 2200-3. Women, Literature, and the Arts.** Introduces the contributions of women to literature, the visual and performing arts, from a historical and cross-cultural perspective. Emphasizes the cultural contexts in which artworks are created, as well as women and men as subjects of representation. Stresses structure, content, and style, along with the acquisition of basic techniques and vocabulary of literary and arts criticism. Prereq., WMST 2000. Approved for arts and sciences core curriculum: human diversity or literature and the arts.

**WMST 2400-3. Women of Color and Activism.** Studies the history of social activism in the United States by women of color, with an emphasis on modes of social activism, issues that have organized specific communities of color, issues that have crossed ethnic/racial boundaries, and the interaction of women from different ethnic/racial groups, including women of color and white women. Recommended prereq., WMST 2000 or 2600. Same as HIST 2636. Approved for arts and sciences core curriculum: United States context.

**WMST 2600-3. Gender, Race, and Class in a Global Context.** Examines the positionality of women in terms of gender, race, ethnicity, class, and power relations in a global context. Approved for arts and sciences core curriculum: contemporary societies.

**WMST 2700-3. Psychology of Contemporary American Women.** Surveys psychological theory and research concerning contemporary American women. Deals with such issues as masculine bias in American culture, sex difference in cognitive functioning and personality, psychological conflict for women between career and home, and, finally, specific areas pertaining to women's mental health. Prereq., WMST 2000 or PSYC 1001. Same as PSYC 2700. Approved for arts and sciences core curriculum: human diversity.

**WMST 3000-3. Gender, Work, and Public Policy.** Provides an analytical framework for understanding the roles gender, sexuality, race and class play in defining the work worlds of women and men in society. Prereq., WMST 2000 or 2050.

**WMST 3020-3. Methods of Inquiry in Gender, Race, Class, and Sexuality.** Examines various research methods and approaches in women's and gender studies. Students will gain practical experience to be able to write a proposal for a significant research project, informed by course readings and discussions. Prereqs., WMST 2000, 2600. Recommended prereqs., WMST 2200 or 2400.

**WMST 3090-3. Critical Thinking in Feminist Studies.** Analyzes the concepts, ideas, arguments, and assumptions that inform major texts in feminist theory through close reading, class discussion, and writing papers. Emphasizes developing reading and writing skills to interpret theoretical arguments. Prereqs., WMST 2000 and junior or senior standing.

**WMST 3100-3. Feminist Theories.** Explores a variety of alternative systematic accounts of, and explanations for, gender inequities. Social norms of both masculinity and femininity are analyzed in relation to other axes of inequality such as class, sexuality, race/ethnicity, neocolonialism, and the domination of nonhuman nature. Prereq., WMST 2000.

**WMST 3110-3. Feminist Practical Ethics.** Explores a variety of personal and public policy issues in light of basic feminist commitment to opposing women's subordination. Provides students not only with a deeper understanding of the specific issues discussed but also with a sense of the ways in which a principled commitment to feminism may influence and be influenced by prevailing interpretations of contemporary ideals and values (such as freedom, equality, and community). Provides an opportunity to develop skills of critical analysis useful in a wide range of contexts. Prereq., WMST 2000 or 2290, and junior or senior standing. Same as PHIL 3110.

**WMST 3200-3. Religion and Feminist Thought.** Examines the origin of patriarchal culture in the theology and practices of Judaism and Christianity. Explores attitudes and beliefs concerning women as Judeo-Christian culture impacts gender roles and gender stratification through reading and discussion. Women's religious experience is studied from the perspective of feminist interpretations of religiosity. Prereq., WMST 2000 or WMST/RLST 2800.

**WMST 3210-3. American Indian Women.** Explores the experiences, perspectives, and status of American Indian women in historical and contemporary contexts. Examines representations of indigenous women in mainstream culture. Emphasizes the agency of American Indian women-their persistence, creativity, and activism, especially in maintaining indigenous traditions.

Prereq., WMST 2000, 2600, or ETHN 2001 or 2003. Restricted to sophomores/juniors/seniors. Same as ETHN 3213. Approved for arts and sciences core curriculum: human diversity.

**WMST 3220-3. Women in Islam.** Examines the historical and contemporary relation between women, gender, and Islamic cultures in different parts of the world. Considers the role and rights of women in Islam, historical and literary representations of Muslim women, and the historically changing constructions of gender and sexuality in Muslim societies. Critically explores the construction of Muslim women in Western discourses, including liberal feminist discourse, and asks whether the representation of Muslim women in these discourses achieves or undermines ends that might be considered "feminist." Course readings will urge students to reexamine their presumptions about piety, secularism, modernity and feminism. Prereq., WMST 2000, 2050, or 2600.

**WMST 3302-3. Facilitating Peaceful Community Change.** Students gain knowledge and skills that enable them to become effective organizers and facilitators of community goals. Focuses on understanding the processes of community building and fostering grass-roots democracy with a multicultural emphasis. Students are encouraged to apply concepts to life experiences and to examine themselves as potential change agents. Theory and summer experience are integrated. Same as INVS 3302.

**WMST 3300-3. Gender, Sexuality and U.S. Law.** Contemporary and historic overview of U.S. courts' treatment of sex and gender. Using the case method, examines policy issues including, but not limited to: same sex marriage and civil unions; privacy; affirmative action; abortion; reproductive technologies; and discrimination based on sex and sexual orientation in education and in the workplace. Prereq., WMST 2000 or PSCI 1101. Same as PSCI 3301. Approved for arts and sciences core curriculum: human diversity.

**WMST 3314-3. Violence Against Women and Girls.** Focuses on aspects of the victimization of women and girls that are "gendered" - namely, sexual abuse and intimate partner abuse. Also explores the importance of race, class, and sexuality in gendered violence. Prereq., WMST 2000. Same as SOCY 3314.

**WMST 3400-3. Gender, Personality, and Culture.** Explores the relationship among gender, culture, and personality. Brings together the disciplines of psychology and sociology in the study of gender and personality formation through investigation of psychoanalytic theory and the social environment. Prereqs., WMST 2000 or 2700, and junior or senior standing.

**WMST 3500-3. Global Gender Issues.** Introduces global gender issues, such as the gendered division of labor in the global economy, migration, women's human rights, environmental issues, gender violence in war, women in the military, nationalism and feminism, and the representation of the Third World in the United States. Offers students the opportunity to broaden their perspectives beyond the borders of the United States. Prereq., WMST 2000, 2050 or 2600. Restricted to sophomores/juniors/seniors.

**WMST 3505-3. Historical and Contemporary Issues of African American Women.** Explores the social, economic, political, historical, and cultural role of African American women from an interdisciplinary perspective. Special emphasis is placed on African American women's rich oral and literary tradition. Prereq., WMST 2000 or ETHN 2001, 2002 or equivalent. Same as ETHN 3502.

**WMST 3600-3. Latinas: History, Culture, and Social Activism.** Drawing from work produced by and about Latinas, discusses the social and cultural construction of race and ethnicity, the function of nationalism, the politics of migration and citizenship, Latina literary production and theory, historiographical trends, Latina feminist theory, activism and the academy, and Latina/o political organizing. Prereq., WMST 2000 or 2600.

**WMST 3650-3. Women and Politics in Latin America.** Examines ways Latin American women have engaged in politics and their participation in social movements, war, peace processes and elections. Focuses on why women "do politics" in certain ways, the role of the State in women's politics, the (dis) advantages of various political strategies, and how political, economic and social changes have affected women's political opportunities and interests. Prereq., WMST 2000 or instructor consent. Recommended prereqs., WMST 2400, 2600, 3600 or 3730. Restricted to juniors/seniors. Same as PSCI 3052.

**WMST 3656-3. History of Women in Progressive Social Movements.** Explores women's involvement in the United States, in international peace, feminist, and civil rights movements of the 19th and 20th centuries. Teaches research

methods by using a variety of primary and secondary sources and writing an original research paper. Prereq., WMST 2000 or HIST 1015 or 1025. Same as HIST 3656.

**WMST 3700-3. Contemporary Topics in Women, Gender, and Sexuality Studies.** Examines selected topics in women, gender, and sexuality in the US context. May be repeated up to 6 total credit hours for different topics. Prereq., WMST 2000 or 2600.

**WMST 3710-3. Topics in Global Gender Studies.** Content varies by semester and reflects relevant issues in global feminist scholarship. May be repeated up to 6 total credit hours. Prereq., WMST 2000 or 2600. Restricted to sophomores/juniors/seniors.

**WMST 3730-3. Third World Women and the Politics of International Development.** Examines the history, characteristics, problems, status and role of Third World women in development itself. Includes the interrelationships between development and population growth, transnational economics, migration, education, agriculture, health, urbanization, development policy and planning, and their impact on women and men in urban and rural areas in Africa, Latin America, the Caribbean, Asia, and Melanesia. Prereq., WMST 2000 or 2600. Restricted to juniors/seniors.

**WMST 3800-3. Advanced Writing in Feminist Studies.** Offers expository writing and training in analytical and descriptive skills, structures or argument, critical thinking, the rhetoric of persuasion, and the development of a personal voice. Readings and papers focus on basic issues in gender studies. Prereq., WMST 2000. Restricted to juniors/seniors. Approved for arts and sciences core curriculum: written communication.

**WMST 3900-3. Asian American Women: Historical and Contemporary Issues.** Drawing from work produced by and about Asian American women, examines historical and contemporary issues including representation of Asian American women, identity politics, feminism, coalition building, and activism for social change. Prereq., WMST 2000 or 2600, or ETHN 1025, 2001, or 2004. Restricted to sophomores/juniors/seniors. Same as ETHN 3905. Approved for arts and sciences core curriculum: United States context.

**WMST 3930 (1-6). Women Studies Internship.** Provides field experience in local and national government and non-governmental agencies focusing on women and gender-related issues. Supervision by approved field instructors. Students must relate their academic experience to their field work experience through a portfolio and a final paper. Prereq., 6 hours of course work in Women's Studies and 30 cumulative credit hours. Restricted to sophomores/juniors/seniors.

**WMST 3940-1. Practicum in Women and Gender Studies.** Enriches the academic experience of majors and minors within the Women and Gender Studies program. This course usually will combine readings from books with lectures and discussions, community outreach and in-house publications spanning the interdisciplinary focus of the program. May be repeated up to 4 total credit hours. Restricted to WMST majors or minors.

**WMST 4000-3. Senior Seminar: Special Topics.** Provides an advanced interdisciplinary course organized around specific topic, problem, or issue relating to women in culture and society (such as feminist theology, women and the law, and the social psychology of women). Course work includes discussion, reading, and written projects. May be repeated up to 6 total credit hours for different topics. Prereqs., WMST 2000 and junior or senior standing.

**WMST 4020-3. Senior Research Seminar.** Intensive-based writing course, designed to develop and strengthen research skills and apply them in the interdisciplinary study of women and gender. May be repeated up to 6 total credit hours for different research topics. Prereq., WMST 2000. Restricted to juniors/seniors.

**WMST 4287-3. Studies in Lesbian, Gay, Bisexual, and Transgender Literature.** Examines selected British, American, and French literary representations of lesbian and gay identity from the early 16th century to the present. Discusses the changing status of homosexuality as a literary and cultural topos, including how same-sex desire is defined, and the rhetorical and ideological difficulties involved in its representation. Specific topics vary each semester. May be repeated up to 9 total credit hours. Restricted to juniors and seniors. Same as ENGL/LGBT 4287.

**WMST 4300-3. Sex, Power, Politics: International Perspectives.** Studies the commercial trade of sexual labor in the global economy, examining theories and assumptions about sexual-economic exchanges and gendered and racialized relations of power in the sex trade. Emphasizes prostitution. Recommended prereq., WMST 2600 or 3100. Restricted to juniors and seniors.

**WMST 4636-3. Lesbian and Gay History: Culture and Politics and Social Change in the U.S.** Considers current theoretical approaches to the history of sexuality and traces the changing meaning of same-sex sexuality in the U.S. through investigation of lesbian and gay identity formation, community development, politics, and queer cultural resistance. Prereqs., WMST 2000 and 2600, and junior or senior standing. Same as HIST 4636/5636.

**WMST 4700-3. Women and Mental Health.** Examines mental health issues of women by focusing on theories of female personality development. Looks at theory and research pertaining to women and psychopathology and to women as patients in traditional and nontraditional forms of treatment. Prereq., WMST/PSYC 2700 or WMST 2000. Same as PSYC 4700.

**WMST 4800-3. Senior Colloquium in Feminist Studies.** Provides students with the opportunity to actively reflect on their education and to complete a research project that incorporates an interdisciplinary and feminist approach to the study of gender, class, race, ethnicity, and sexuality. Offered each spring. Prereq., WMST 3020. Restricted to senior WMST majors.

**WMST 4840 (1-6). Independent Study.** May be repeated up to 7 total credit hours.

**WMST 4950-3. Honors Research.** For qualified WMST majors working on the research phase of departmental honors. Prereq., junior/senior standing and 3.30 overall GPA.

**WMST 4999 (1-3). Senior Honors Thesis.** Qualified women's studies majors may write an honors thesis, an in-depth research paper, on a topic of choice. Thesis hours available to majors only after successfully completing the research phase.

**WMST 5090-3. Feminist Theories.** Begins with a reconsideration of the 19th century antecedents of contemporary Anglophone feminist theory, but primary focus on debates of the last 25 years. Theme throughout is gender, how gender should be understood, and how it interrelates with our understandings of class, race, embodiment, sexuality, and knowledge. Required for WMST graduate certificate. May be repeated up to 6 total credit hours.

**WMST 5190-3. Feminist Methodology.** Explores themes that emerge in research across a range of disciplines. They include experience and interpretation, the social position of the researcher, language and argument structure, knowledge and power, bias and objectivity, and the ethics and politics of research. Required for WMST graduate certificate.

**WMST 5290-3. Special Topics in Women and Gender Studies.** Examines current literature relating to a problem, issue, or topic in women and gender studies. Offers advanced, interdisciplinary perspectives rooted in feminist, gender, cultural and/or social theories. Provides intensive reading, discussion, and research opportunities into gender and war, women and globalization, women's social movements, gender and citizenship, gender and colonization, gender and collective memory, and cultural representations of gender. May be repeated up to 6 total credit hours. Recommended prereqs., WMST 5090 and 5190.

## Crosslisted Courses by Discipline

### Art and Art History

**WMST 4769-3. Gender Studies in Early Modern Visual Culture.** Same as ARTH 4769. Approved for arts and sciences core curriculum: human diversity. Same as ARTH 4769.

### Chicano Studies

**WMST 3135-3. Chicana Feminisms and Knowledges.** Provides insight into the present socioeconomic condition of Mexican American women and the concept of feminismo through interdisciplinary study of history, sociology, literary images, and film portrayals. Prereq., ETHN 1016, 2001 or 2536 or equivalent. Same as ETHN 3136. Approved for arts and sciences core curriculum: human diversity.

**Classics**

**WMST 2100-3. Women in Ancient Greece.** Same as CLAS 2100. Approved for arts and sciences core curriculum: human diversity.

**WMST 2110-3. Women in Ancient Rome.** Same as CLAS 2110. Approved for arts and sciences core curriculum: human diversity.

**English**

**WMST 1260-3. Introduction to Women's Literature.** Same as ENGL 1260. Approved for arts and sciences core curriculum: human diversity.

**WMST 3267-3. Women Writers.** Same as ENGL 3267.

**WMST 3919 (1-3). Service Learning Practicum.** Under faculty supervision, students participate in a service learning project correlated with the academic subject. May be repeated up to 6 total credit hours.

**WMST 4277-3. Topics in Women's Literature.** Same as ENGL 4277.

**Ethnic Studies**

**WMST 3670-3. Immigrant Women in the Global Economy.** Critical examination of immigrant women's participation in the global economy. Focuses on the relationship between larger social forces and the role of women in migration and the labor force. Emphasis on Latinas and Asian immigrant women. Restricted to juniors/seniors or instructor consent. Approved for arts and sciences core curriculum: human diversity.

**Geography**

**WMST 3672-3. Gender and Global Economy.** Same as GEOG 3672. Approved for arts and sciences core curriculum: human diversity.

**German**

**WMST 3601-3. German Women Writers.** Taught in English. Same as GRMN 3601. Approved for arts and sciences core curriculum: human diversity.

**WMST 4301-3. Gender, Race, and Immigration in Germany and Europe.** Introduce students to debates surrounding migration and race in contemporary Germany. Emphasis on reading texts in context using tools of cultural studies, integrating analyses of gender, race, nation, and sexuality. Texts may include film, literature, television, magazine images, etc. Topics include: questioning "multiculturalism," self-representation, integration, Islam, citizenship, violence, public space, youth culture, racism and nationalism. Same as GRMN 5301 and WMST 4301. Approved for arts and sciences core curriculum: human diversity.

**History**

**WMST 4063-3. Women in Victorian England.** Same as HIST 4063.

**WMST 4614-3. Women and Society in Industrial Europe.** Same as HIST 4614.

**WMST 4616-3. History of Women in the United States to 1890.** Same as HIST 4616.

**WMST 4619-3. Women in Asian History.** Same as HIST 4619.

**WMST 4626-3. History of Women in the United States since 1890.** Same as HIST 4626.

**WMST 4640-3. Women, Gender, and War.** Same as HIST 4640.

**Honors**

**WMST 3004-3. Women in Education.** Same as HONR 3004. Approved for arts and sciences core curriculum: human diversity.

**Journalism**

**WMST 4331-3. Women and Popular Culture.** Same as JOUR 4331.

**LGBT Studies**

**WMST 2030-3. Introduction to Lesbian, Gay, Bisexual, and Transgender Studies.** Same as LGBT 2000. Approved for arts and sciences core curriculum: human diversity.

**Philosophy**

**WMST 2290-3. Philosophy and Women.** Same as PHIL 2290. Approved for arts and sciences core curriculum: human diversity.

**Political Science**

**WMST 3300-3. Gender, Sexuality, and the U.S. Law.** Same as PSCI 3301.

**WMST 3650-3. Women and Politics in Latin America.** Same as PSCI 3052.

**Religious Studies**

**WMST 2800-3. Women and Religion.** Same as RLST 2800. Approved for arts and sciences core curriculum: human diversity.

**Russian**

**WMST 4471-3. Women in 20th Century Russian Culture.** Same as RUSS 4471 and GSLL 5471. Approved for arts and sciences core curriculum: human diversity.

**Nordic (Formerly Scandinavian)**

**WMST 3208-3. Women in Nordic Society: Modern States of Welfare.** Examines the role and status of women and marginalized social classes in the Nordic countries, whose societies have been heralded as egalitarian models since the twentieth century. Texts include a variety of media, from literature to sociological works to artifacts of political and popular culture. Same as SCAN 3208. Approved for arts and sciences core curriculum: human diversity.

**Sociology**

**WMST 1006-3. The Social Construction of Sexuality.** Restricted to sophomores, juniors, and seniors. Same as SOCY 1006.

**WMST 1016-3. Sex, Gender, and Society 1.** Same as SOCY 1016. Approved for arts and sciences core curriculum: human diversity.

**WMST 3012-3. Women, Development, and Fertility.** Restricted to junior/senior WMST majors. Same as SOCY 3012. Approved for arts and sciences core curriculum: human diversity.

**WMST 3016-3. Marriage and the Family in the United States.** Restricted to junior/senior WMST majors. Approved for arts and sciences core curriculum: United States context. Same as SOCY 3016.

**WMST 3044-3. Race, Class, Gender, and Crime.** Same as SOCY 3044.

**WMST 3046-3. Topics in Sex and Gender.** Same as SOCY 3046.

**WMST 4016-3. Sex, Gender, and Society 2.** Studies status and power differences between the sexes at individual, group, and societal levels. Examines empirically established sex differences, and reviews biological, psychological, and sociological explanations for gender differences. Prereqs., SOCY 1016 or WMST 2000. Restricted to sophomores/juniors/seniors. Same as SOCY 4016.

**WMST 4086-3. Family and Society.** Restricted to junior/senior WMST majors. Same as SOCY 4086.

**Theatre**

**WMST 4041-3. Women and Theatre of the 20th Century.** Same as THTR 4041.

**WMST 4073-3. Performing Voices of Women.** Same as THTR 4073.

**Writing and Rhetoric, Program for**

**WRTG 1100-4. Extended First-Year Writing and Rhetoric.** Extended version of WRTG 1150 that carries an additional hour of credit and is intended for students desiring more preparation and practice in college writing. Meets the same goals as WRTG 1150. Features one extra hour of small group work out of class. Focuses on critical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course places a premium on invention, drafting, and thoughtful revision. For placement criteria, see the arts and sciences advising office. May be repeated up to 8 total credit hours. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**WRTG 1150-3. First-Year Writing and Rhetoric.** Rhetorically informed introduction to college writing. Focuses on critical analysis, argument, inquiry, and information literacy. Taught as a writing workshop, the course places a premium on invention, drafting, and thoughtful revision. For placement criteria, see the arts and sciences advising office. May be repeated up to 6 total credit hours. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**WRTG 1250-3. Advanced First-Year Writing and Rhetoric.** Advanced version of WRTG 1150 intended for more experienced writers, this course meets the same goals as WRTG 1150 but at a more challenging level. Taught as a writing

workshop, the course places a premium on invention, drafting, and thoughtful revision. For placement criteria, see the arts and sciences advising office. May be repeated up to 6 total credit hours. Meets MAPS requirement for English. Approved for arts and sciences core curriculum: written communication.

**WR TG 1840 (1-3). Independent Study in Writing.** May be repeated up to 8 total credit hours.

**WR TG 2020-3. Introduction to Creative Nonfiction.** Explores from both the reader's and writer's perspectives the forms of creative nonfiction, including personal essay and memoir. Students will read and write extensively within this genre, develop skill in revision and peer critique, and learn how to submit work for publication. Prereq., WR TG 1150 or equivalent (completion of lower-division writing requirement).

**WR TG 2090-3. Electives in Writing.** Explores a variety of academic and professional writing genres, ranging from research to technical writing, in intensive workshops. Students read and write extensively across genres. Check with program for semester offerings. May be repeated up to 6 total credit hours if the topics are different. Designed for self-motivated students in all majors. Does not fulfill core requirements. Prereq., WR TG 1150 or equivalent.

**WR TG 3007-3. Writing in the Visual Arts.** Enables studio art and art history majors to improve their writing skills through organization, presentation, critique, and revision. Writing assignments include formal writing (analysis and argument), informal writing, and grant proposals. Prereq., junior or senior standing. Credit not granted for this course and FINE 3007. Approved for arts and sciences core curriculum: upper-division written communication.

**WR TG 3020-3. Topics in Writing.** Through sustained inquiry into a selected topic or issue, students will practice advanced forms of academic writing. The course emphasizes analysis, criticism, and argument. Taught as a writing workshop, the course places a premium on substantive, thoughtful revision. May be repeated up to 6 total credit hours. Restricted to arts and sciences juniors and seniors. Same as NRLN 3020. Approved for arts and sciences core curriculum: written communication.

**WR TG 3030-3. Writing on Science and Society.** Through selected reading and writing assignments, students consider ethical and social ramifications of science policy and practice. Focuses on critical thinking, analytical writing, and oral presentation. Taught as a writing workshop, the course addresses communication with professional and non-technical audiences. May be repeated up to 6 total credit hours. Restricted to junior and senior engineering/physical and biological science majors. Approved for arts and sciences core curriculum: written communication.

**WR TG 3035-3. Technical Communication and Design.** Rhetorically informed introduction to technical writing that hones communication skills in the context of technical design activities. Treats design as a collaborative, user-oriented, problem-based activity, and technical communication as a rhetorically informed and persuasive design art. Taught as a writing workshop emphasizing critical thinking, revision, and oral presentation skills. Focuses on client-driven design projects and effective communication with multiple stakeholders. May be repeated up to 6 total credit hours. Restricted to juniors and seniors in engineering; architecture and planning; and the physical, earth, and life sciences. Approved for arts and sciences core curriculum: written communication.

**WR TG 3040-3. Writing on Business and Society.** Through selected reading and writing assignments, students examine ethical and social issues in the context of business decision-making processes. Focuses on critical thinking, analytical writing, and oral presentation. Taught as a writing workshop, the course emphasizes effective communication with professional and non-technical audiences. May be repeated up to 6 total credit hours. Restricted to junior and senior business/economics IAFS majors. Approved for arts and sciences core curriculum: written communication.

**WR TG 3090 (1-3). Open Topics in Writing: Advanced.** Advanced topics course providing intensive, specialized writing instruction in selected topics. Check with the program for semester offerings. May be repeated up to 6 total credit hours if the topics are different. Prereqs., WR TG 3020, or 3030, or 3040, or instructor consent.

**WR TG 3840 (1-3). Independent Study.** May be repeated up to 6 total credit hours.

**WR TG 5050-3. Graduate Studies in Writing and Rhetoric.** Special topics and methods course in composition theory, research, and pedagogy. Topics vary by semester. May be repeated up to 9 total credit hours. Prereq., instructor consent.

**WR TG 5840 (1-3). Independent Study: Writing and Rhetoric.** Independent study. May be repeated up to 6 total credit hours. Prereqs., graduate standing and instructor consent.

## Accounting

**ACCT 2820-3. Introduction to Personal Financial Planning.** Introduces the concepts, tools, and applications of personal financial planning. Provides the students with tools and techniques for managing their personal finances. With these skills, students gain the ability to effectively deal with their ever-changing financial environment. Restricted to students with at least 26 hours completed.

**ACCT 3220-3. Corporate Financial Reporting 1.** First of a two-course sequence intended to provide students with increased fluency in the language of business. Focuses on U.S. and international accounting concepts and methods that underlie financial statements and the related implications for interpreting financial accounting information. Prereqs., BCOR 2000 and 2200. Restricted to 52 hours completed.

**ACCT 3230-3. Corporate Financial Reporting 2.** Second in a two-course sequence building and extending detailed knowledge of preparation, analysis, and use of financial statements. Prereqs., ACCT 3220 and 52 hours completed.

**ACCT 3320-3. Cost Management.** Provides cost analysis for the support of management decision making. Analyzes activities, cost behavior, role of accounting in planning, financial modeling, and managerial uses of cost data. Prereqs., BCOR 2000 and 2200. Restricted to students with 52 hours completed.

**ACCT 4240-3. Advanced Financial Accounting.** Examines advanced financial accounting theory and practice, emphasizing U.S. and international accounting for business combinations, consolidated financial statements, and accounting for partnerships. Prereqs., ACCT 3230. Restricted to 52 hours completed. Same as ACCT 5240.

**ACCT 4250-3. Financial Statement Analysis.** Focuses on the use of U.S. and international accounting information by decision-makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes equity valuation and risk analysis. Prereq., ACCT 3220. Restricted to 52 hours completed. Same as ACCT 5250.

**ACCT 4330-3. Advanced Cost Management.** Critically analyzes advanced topics in cost management. Uses cases and current readings. Prereq., ACCT 3320. Same as ACCT 5330.

**ACCT 4430-3. Personal Financial Planning.** Extends the concepts, tools, and applications of personal finance and investments beyond ACCT 2820. Focuses on the development of a financial plan to achieve financial goals. Restricted to 52 hours completed.

**ACCT 4440-3. Income Taxation of Individuals.** Examines concepts and structure of the United States income tax system. Focuses on concepts affecting all taxpayers, with emphasis on individual taxation. Prereq., ACCT 3220. Same as ACCT 5440.

**ACCT 4540-3. Accounting Information Systems.** Considers the interaction of accountants with information systems and the role of accounting information systems in business processes. Focuses on the tools used by accountants and provides an understanding of accounting as an information system. Prereq., ACCT 3220. Same as ACCT 5540.

**ACCT 4620-3. Auditing and Assurance Services.** Emphasizes the value of assurance services, including the market for financial-statement audits, and the audit decision process, from obtaining a client through planning and testing, to issuance of the audit report. Focuses on making judgments and decisions under conditions of uncertainty and continually evaluating the substance of business transactions over their form. Prereq., ACCT 3230. Same as ACCT 5620.

**ACCT 4700-3. International Accounting.** Intensive focus on international financial statement analysis, cultural and economic differences that affect financial reporting in various countries. Examples include international financial reporting standards and accounting for foreign currency transactions. Prereq., ACCT 3230. Same as ACCT 5700.

**ACCT 4800-3. Accounting for Government and Nonprofit Organizations.** Reporting, planning and control of government and nonprofit organizations. Includes program budgets, responsibility accounting, and fund accounting. Prereq., ACCT 3220. Same as ACCT 5800.

**ACCT 4820-3. Topics in Business.** Offered irregularly to provide opportunity for investigation of new frontiers in accounting. Prereq., ACCT 3220. Same as ACCT 5820.

**ACCT 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Accounting. Restricted to juniors/seniors. Same as ACCT 5825.

**ACCT 4850-3. Senior Seminar in Accounting.** This seminar examines the nature of accounting theory and practice from perspectives of economics law, globalization, accounting, ethics, and moral reasoning. This course also explores issues including implications of institutional factors, such as Sarbanes-Oxley, SEC, FASB, IFRS, and capital markets. Prereqs., ACCT 3230, one 4000-level ACCT course. Restricted to 102 hours completed and graduating senior ACCT majors. Formerly BCOR 4001.

**ACCT 4900 (1-3). Independent Study.** Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well-qualified business seniors. Departmental form required.

**ACCT 5240-3. Advanced Financial Accounting.** Prereq., ACCT 3230. Same as ACCT 4240.

**ACCT 5250-3. Financial Statement Analysis.** Prereq., ACCT 3220. Same as ACCT 4250.

**ACCT 5330-3. Advanced Cost Management.** Prereq., ACCT 3320 or equivalent. Same as ACCT 4330.

**ACCT 5440-3. Income Taxation of Individuals.** Prereq., ACCT 3220 or equivalent. Same as ACCT 4440.

**ACCT 5540-3. Accounting Information Systems.** Prereq., ACCT 3220 or equivalent. Same as ACCT 4540.

**ACCT 5620-3. Auditing and Assurance Services.** Prereq., ACCT 3220 or equivalent. Same as ACCT 4620.

**ACCT 5700-3. International Accounting.** Prereq., ACCT 3230 or equivalent. Same as ACCT 4700.

**ACCT 5800-3. Accounting for Government and Nonprofit Organizations.** Prereq., ACCT 3220 or equivalent. Same as ACCT 4800.

**ACCT 5820-3. Topics in Business.** Prereq., ACCT 3230 or equivalent. Same as ACCT 4820.

**ACCT 5825-3. Experimental Seminar.** Prereq., ACCT 3230 or equivalent. Same as 4825.

**ACCT 6000 (1-4). Academic Internship in Accounting.** Offers students the opportunity to gain professional work experience in an accounting or tax position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Includes lectures and a course paper. Students may not preregister for this course, and they must contact the Director of the concurrent degree program in accounting for approval. Prereq., at least 90 credit hours of course work and a minimum GPA of 3.00, and instructor consent.

**ACCT 6220-3. Corporate Financial Reporting.** Provides an in-depth study of the concepts underlying contemporary financial accounting practice. Includes preparation and analysis of financial statements and the application of concepts to selected current issues. Students with credit for ACCT 3220 and 3230 or equivalents may not receive credit for ACCT 6220. Prereq., MBAC 6020 or equivalent. Same as MBAX 6700.

**ACCT 6250-3. Financial Statement Analysis.** Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by investors, security analysts, bank lending officers, and auditors. Emphasizes equity analysis. Prereq., MBAC 6020 or equivalent. Same as MBAX 6710.

**ACCT 6260-3. Seminar: Managerial Accounting.** Explores cost management, especially as related to organizational decision making, planning, and control. Emphasizes case analysis and applications. Prereq., MBAC 6020 or equivalent, or instructor consent.

**ACCT 6270-3. Seminar: Income Determination.** Critical analysis of problems and theory of measurement and reporting of periodic net income of business organizations. Net income models, research efforts, and role of professional

accounting organizations. Current issues and problems given special attention. Prereq., ACCT 3230 or equivalent, or instructor consent.

**ACCT 6350-3. Current Issues in Professional Accounting.** Focuses on the ethical challenges facing professional accountants in auditing, tax, management accounting, and consulting careers. The course covers topics such as whistleblowing, fraud detection, and how to improve actual and reported financial performance whether it is through earnings management or strategic redirection. Prereq., ACCT 3230 or equivalent, or instructor consent.

**ACCT 6420-3. Research and Writing in Income Taxation.** Studies and applies the method used in tax research and tax planning, with the goal of developing tax research, technical writing, and tax planning skills. Topics include examining primary and secondary sources of federal tax law, evaluating the hierarchy of these sources, and developing technical writing skills using deductive legal reasoning. Prereq., ACCT 5440 or equivalent, or instructor consent.

**ACCT 6430-3. Taxation of Conduit Entities.** Studies federal income taxation of pass-through entities such as those used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests, and liquidation. Prereq., ACCT 5440 or equivalent, or instructor consent. Coreqs., ACCT 6420 and 6700. Same as LAWS 6167.

**ACCT 6440 (2-3). Tax Policy.** Offers a research seminar exploring policy issues of taxation including recent legislative proposals. Students prepare a publishable research paper on a tax policy topic agreed upon with the instructor. Prereq., ACCT 5440 or equivalent, or instructor consent. Coreqs., ACCT 6420 and 6700.

**ACCT 6450-3. Taxation of Corporations.** Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests, and liquidation. Prereq., ACCT 5440 or instructor consent. Coreqs., ACCT 6420 and 6700. Same as LAWS 6157.

**ACCT 6490-3. Taxation of Natural Resources.** Concerned with tax problems encountered in acquisition, operation, and disposition of natural resource properties. Topics include depletion, lease bonuses, intangible drilling costs, depreciation, and financing arrangements. Prereqs., admission to the graduate tax program, ACCT 6700 or equivalent, or instructor consent.

**ACCT 6500-3. Special Topics in Taxation.** Covers a diverse array of issues in taxation. Highlights areas of current interest and draws on the strengths of leading outside authorities as guest lecturers in various topic areas. Prereq., ACCT 6420 and 6700.

**ACCT 6620-3. Advanced Auditing: Business Risk and Decision Analysis.** Explores contemporary issues, historical developments, and selected topics pertinent to business assurance services by independent accountants. Emphasizes improving both the decision behavior of decision makers and the quality of information, or its context, for decision makers. Prereq., ACCT 5620 or equivalent.

**ACCT 6700-4. Income Taxation.** Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual. Prereq., ACCT 5440 or equivalent. Same as LAWS 6007.

**ACCT 6710-3. Federal Estate and Gift Tax.** Analyzes federal estate and gift taxation of inter vivos and testamentary transfers, introduces income taxation of estates and trusts, and involves elementary estate planning. Prereq., ACCT 5440 or equivalent. Coreqs., ACCT 6420 and 6700. Same as LAWS 7207.

**ACCT 6720-2. Estate Planning.** Discusses problems and solutions for owners of various-sized estates and different types of assets including jointly-held property, stock in closely-held corporations and farms, analysis of federal taxation of generation-skipping transfers in trust, postmortem estate planning, and drafting of trusts and wills. Prereq., ACCT 6710 or equivalent. Same as LAWS 7217.

**ACCT 6780-3. International Taxation.** Covers basic aspects of the United States taxation of income earned abroad by its citizens and the taxation income derived by foreign persons from U.S. sources, including the implications of income tax treaties. Same as LAWS 7617.

**ACCT 6820 (1-3). Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in accounting. Prereq. varies.

**ACCT 6900 (1-6). Independent Study.** Requires prior consent of instructor under whose direction study is taken. Departmental form required.

**ACCT 6940 (1-6). Master's Degree Candidacy.** Departmental form required.

**ACCT 6950 (1-4). Master's Thesis.**

**ACCT 7300-3. Doctoral Seminar: Introduction to Accounting Research.** Introduces students to seminal accounting research, covering a variety of topics and research methods. Provides students with instruction and experience in reading, critiquing and discussing accounting research. Provides a framework for understanding the financial reporting choice from both contracting and evaluation perspectives.

**ACCT 7320-3. Doctoral Seminar: Accounting and Capital Markets I.** One semester of a two-semester course in accounting-related capital markets and research, spanning topics such as: information intermediaries; earnings management; auditing and other monitoring mechanisms; efficient versus opportunistic accounting choice related to contracts between the firm and its stakeholders; cost of capital; and market efficiency with respect to accounting information. Papers covered apply primarily economics-based archival and empirical research methods. Prereq., ACCT 7300.

**ACCT 7330-3. Doctoral Seminar: Accounting and Capital Markets 2.** The second semester of a two-semester course in accounting-related capital markets research. See ACCT 7320 for a description of the course content which is allocated evenly between ACCT 7320 and 7330.

**ACCT 7340-3. Doctoral Seminar: Managerial Accounting Research.** Survey of managerial accounting research, emphasizing a variety of methodologies including economics-based archival empirical and experimental approaches. Topics include: management performance measurement; management incentives; non-financial performance measures; management control systems; cost behavior and cost structure; intra-firm transfer pricing; inter-firm relationships and knowledge sharing; risk preferences, risk taking and risk sharing; strategic performance measurement; agency theory; and budgetary slack and performance. Prereq., ACCT 7300.

**ACCT 7800-3. Doctoral Seminar: Accounting Theory.** Follows the evolution of game-theoretic analytical research and application of analytical methods to topics including: accounting-based valuation, discretionary disclosure, stewardship role of accounting, insider trading and imperfect capital market models, signaling through accounting choice, deferred tax accounting, audit sampling, auditor rotation, and low balling. Describes implications of analytical results for primarily economics-based empirical research designs. Opened only for doctoral students.

**ACCT 7830-3. Doctoral Seminar: Accounting Research.** Designed to assist the doctoral student in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in accounting. Special attention given to the development of thesis topics.

**ACCT 8820 (1-6). Graduate Seminar.** Provides opportunity for investigation of new frontiers in accounting through an experimental seminar. May be repeated up to 6 total credit hours. Prereq. varies. Offered irregularly.

**ACCT 8900 (1-3). Independent Study.** Requires instructor's consent and departmental form (taught as doctoral seminar).

**ACCT 8990 (1-10). Doctoral Thesis.**

## Business Administration

**BADM 2050-3. Honors/Special Topics.** Variable topics in business, drawing from a variety of disciplines. Prereq., 3.50 minimum cumulative GPA.

**BADM 2880-3. Special Topics.** Explores historical developments, contemporary issues, industry trends, and best practices pertinent to the business of sports. The course examines how sports enterprises are managed, and the impacts that such enterprises have on the economic and social fabric of communities. The course is designed to provide sufficient background for educated consumption of this literature and pursuit of further study if desired. Restricted to sophomores/juniors/seniors.

**BADM 3880-3. Special Topics.** Introduces students to the many facets of the marketing of sport and marketing through sport. Theoretical and practical applications of marketing sport are examined. The course will provide students

with an understanding of current marketing concepts, and best business practices, related to sports enterprises and a foundation for pursuit of further study and work in sports and event marketing. Restricted to juniors/seniors.

**BADM 3930 (1-6). Internship.** Student training and participation in government or industry environment under faculty supervision. Prereqs., BCOR 1000, 2000, 2010, 2050, GPA 2.50, junior standing and instructor consent.

**BADM 4010-3. Sustainable Resort Tourism.** Focuses on resort communities in the Western U.S. and Canada and the challenges they face in planning, development, management and sustainability. Course topics include, but may not be limited to, business development factors for tourism and non-tourism businesses.

**BADM 4820 (1-3). Special Topics.** Variable topics in business drawing from a variety of business disciplines.

**BADM 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Business Administration. Restricted to juniors/seniors.

**BADM 4830 (1-3). Special Topics.** Various topics in business and society drawing from a variety of business disciplines. Restricted to junior/senior business majors.

**BADM 6930-3. Assessing Sustainable Energy Technologies.** Focuses on the technological and cost "fundamentals" of emerging energy technologies, including solar, wind, biomass, oceanic, geothermal, hydropower, fuel cell (hydrogen), nuclear, and other more exotic energy sources. Investigates the technology feasibility, economic viability and progress of each technology, as well as its economic opportunities and challenges.

## Business Core

**BCOR 1010-3. Introduction to Business.** Provides an overview of how business works through the application and integration of the fundamental business functions of accounting, finance, management, marketing, and systems. Weekly discussion of current events will focus on entrepreneurship, international business, business and society, and career topics. Restricted to freshmen business majors.

**BCOR 1020-3. Business Statistics.** Covers descriptive statistics, basic probability theory, statistical inference, correlation and regression analysis, and time series analysis. Uses statistical features of commonly used business spreadsheet software. Students use this software to solve problems using real business data. Prereqs., MATH 1071 and successful completion of computer proficiency test. Formerly BCOR 2010.

**BCOR 2000-4. Accounting and Financial Analysis.** Builds a basic understanding of how information regarding a firm's resources and obligations is conveyed to decision makers both outside and within the firm. Prereq., BCOR 1010, 1020 and successful completion of the Excel proficiency exam. Restricted to students with a minimum of 26 credit hours.

**BCOR 2200-3. Introductory Finance.** Emphasizes the concepts and skills needed to make sound financial decisions. Topics include financial statement analysis, time value of money, interest rates, bond valuation and bond markets, stock valuation and stock markets, cost of capital and capital structure, capital budgeting, financial forecasting, and working capital management. Prereqs., BCOR 1020, 2000, and ECON 2010 or 2020. Coreq. second semester of ECON series and 26 hours completed. Formerly BCOR 2100.

**BCOR 2300-3. Adding Value with Management.** Focuses on how modern business firms compete in the global marketplace by adding value. Examines the value-chain of a firm and how firms use people, organizations, operations, and information systems to compete and win in world markets. Also covers contemporary issues such as total quality management, process reengineering, teams and team building, employee empowerment, and horizontal organizations. Prereq., BCOR 1010 and successful completion of the Excel proficiency exam. Restricted to students with a minimum of 26 hours. Formerly BCOR 2150.

**BCOR 2400-3. Fundamentals of Marketing.** Examines how activities in organizations provide value to the purchasers of its products and services. Includes gathering information about consumers and competitors through research and information systems, applying knowledge and technology to the design of products and services, communicating information to consumers and

organizational units, and pricing and distributing products and services. Also includes issues in global marketing, ethics and diversity, relationship marketing, and integrating marketing with financial analyses. Prereq., BCOR 1010, BCOR 1020. Coreq., second semester of ECON series. Restricted to sophomores/juniors/seniors, and 26 hours completed. Formerly BCOR 2050.

**BCOR 2500-3. Introduction to Operations and Information Management.** Explores the complexity and uncertainty of today's global business environment from a systems perspective. Provides foundations, technologies, and practical skills in describing, analyzing, and improving business procedures. Prereq., BCOR 1010, BCOR 1020, and successful completion of the Excel proficiency exam.

**BCOR 3000-3. Business Law, Ethics, and Public Policy.** Surveys major topics and case studies in business law, business ethics, and government policy. Business law topics include the American legal system, constitutional law, common law, contract principles, criminal and tort law, intellectual property, employment law, and personal and real property law. Ethics topics include the philosophy of law, legal versus moral issues, and professional responsibility. Public policy topics include the roles of business and government, types of government intervention, and the nature and theory of governmental policy formulation. Prereq., 52 hours completed.

**BCOR 3010-3. Business Applications of Social Responsibility.** Explores alternative views of the role of business in our global society through detailed case analyses, beginning with the free market view. This is a cross-functional area course that helps students to isolate and articulate their personal values that will shape business conduct. Emphasizes individual and organizational responsibility for business behavior in the broader social context. Prereq., BCOR 1010, 1020, 2000, 2200, 2300, 2400, 2500 and 59 hours completed.

## Business Law

**BSLW 4120-3. Advanced Business Law.** Continuation of BCOR 3000. Covers sales and lease transactions, negotiable instruments, creditor rights and bankruptcy, secured transactions, agency, business organizations, protection of property, and other advanced topics in legal and regulatory environments. BCOR 3000 and BSLW 4120/5120 together cover the business law topics tested on the CPA exam. Prereqs., BCOR 3000 and junior standing. Same as BSLW 5120.

**BSLW 4820 (1-3). Topics in Business Law.** Experimental course offered irregularly for purpose of presenting new subject matter in business law.

**BSLW 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Business Law. Restricted to juniors/seniors.

**BSLW 4900 (1-3). Independent Study.**

**BSLW 5120-3. Advanced Business Law.** Same as BSLW 4120.

**BSLW 6900 (1-6). Independent Study.**

## Business Policy and Strategy Management

**BPOL 6940 (1-3). Master's Candidate for Degree.**

**BPOL 6950 (1-6). Master's Thesis.**

**BPOL 7500-3. Doctoral Seminar: Strategic Management 1.** Provides an overview of the literature, including classic articles and books, in business strategy and policy (strategic management). Brings the student up to date on schools of thought, research issues, and practical applications in strategic management.

**BPOL 7530-3. Doctoral Seminar: Strategic Management 2.** Continuation of BPOL 7500. Prereq., BPOL 7500.

**BPOL 7560-3. Entrepreneurship, International Business and Technology Management.** Provides doctoral students with an understanding of strategic management and entrepreneurship theory, as applied to international business and technology management literatures. Additionally, students are



exposed to research methods in the strategy and entrepreneurship arenas. Prereqs., BPOL 7500 and 7530.

**BPOL 8900 (1-3). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**BPOL 8990 (1-10). Doctoral Thesis.**

## Entrepreneurship and Small Business Management

**ESBM 3700-3. Entrepreneurial Environments.** Overview of entrepreneurship, addresses topics such as opportunity recognition, sources of funding, alternative entrepreneurship such as franchising and corporate entrepreneurship, and managing rapid growth. Prereqs., BCOR 2000, 2050, 2100, 2150, or BCOR 2000, 2200, 2300, 2400. Restricted to students with 52 hours completed.

**ESBM 4570-3. Entrepreneurial Finance.** Focuses on the financial concepts, issues, methods, and industry practices relevant to entrepreneurial decision makers. Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering. Provides an understanding of the segments of the capital markets specializing in start-ups and growth financing. Prereqs., BCOR 2200 and ESBM 3700. Restricted to students with 52 hours completed.

**ESBM 4820-3. Special Topics in Entrepreneurship.**

**ESBM 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Entrepreneurship and Small Business Management. Restricted to juniors/seniors.

**ESBM 4830-3. Entrepreneurship Business Planning and Preparation.** In-depth preparation for writing a business plan for a new business venture. Prereqs., ESBM 3700 and 4570. Same as EMEN 4825.

**ESBM 4900-3. Projects in Entrepreneurial Companies.** Complete projects in preselected entrepreneurial companies. Prereq., instructor consent.

## Finance

**FNCE 3010-3. Corporate Finance.** Covers the theory and practices governing the management of capital in a business firm. Examines the determinants of capital requirements, methods of obtaining capital, problems of internal financial management, and methods of financial analysis. Prereqs., BCOR 1020, 2000, and 2200. Restricted to students with 52 hours completed.

**FNCE 4000-3. Financial Institutions Management.** Analyzes the structure, markets, and regulations of financial institutions. Studies problems and policies of internal management of funds, loan practices and procedures, investment behavior, deposit and capital adequacy, liquidity, and solvency. Prereqs., FNCE 3010 and 3020.

**FNCE 4030-3. Investment and Portfolio Management.** Develops modern portfolio theory and applies it to pricing both individual assets and portfolios of assets. Topics include Markowitz portfolio selection model, capital asset pricing model, arbitrage pricing theory, options, futures, bonds, portfolio performance measurement, and issues of market efficiency. Prereqs., FNCE 3010 and 3020.

**FNCE 4040-3. Derivative Securities.** Develops the modern theory of contingent claims in a mathematical framework oriented toward applications. Examines how to use derivatives for risk management and to tailor portfolio payoffs. Provides an in-depth analysis of the properties of options. Prereqs., FNCE 3010 and 3020.

**FNCE 4050-3. Capital Investment Analysis.** Focuses on capital budgeting and investment issues. Emphasizes issues relating to cash flows, capital rationing, the investment versus financing decision, leasing, fluctuating rates of output, investment timing, capital budgeting under uncertainty, and investment decisions with additional information. Prereqs., FNCE 3010 and 3020.

**FNCE 4060 (1-6). Special Topics in Finance.** Presents new subject matter in finance. The summer offering is the London Seminar in International Finance and Business. Prereqs. vary depending upon course offering. See advising office.

**FNCE 4070-3. Financial Markets and Institutions.** Examines the economics of financial markets and the management of financial institutions, both domestic and international. Topics include an overview of U.S. and international financial markets, pricing and risk factors, interest rates, markets for securities and financial services, and markets for derivative financial instruments. Prereq., BCOR 2200. Restricted to students with 52 hours completed. Formerly FNCE 3020.

**FNCE 4820-3. Topics in Finance.** Offered irregularly to provide opportunity for investigation into new frontiers in finance. May be repeated up to 6 total credit hours. Restricted to 52 hours completed.

**FNCE 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Finance. Restricted to juniors/seniors.

**FNCE 4850-3. Business Senior Seminar in Finance.** Develops analytical and decision making skills necessary to address real-world business finance situations. Topics include financial analysis and forecasting, capital budgeting, valuation, capital structure policy, international finance, and financial ethics. Uses a combination of lecture and cases; team and individual work. Prereqs., ACCT 3220, FNCE 3010, 4030 and 102 hours completed. Restricted to graduating senior FNCE majors. Formerly BCOR 4002.

**FNCE 4900 (1-6). Independent Study.** Intended only for exceptionally well qualified business seniors. Prereq., prior consent of dean and instructor under whose direction study is taken, and departmental form.

**FNCE 6820 (1-3). Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in finance.

**FNCE 6900 (1-6). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**FNCE 6950 (1-6). Master's Thesis.**

**FNCE 7100-3. Doctoral Seminar: Finance Theory.** Develops the foundations for the study of modern financial economics by analyzing individuals' consumption and portfolio decisions in the context of risk and then traces the implications to market valuation of traded securities. Topics include the meaning and measurement of risk, portfolio theory, the Capital Asset Pricing Model, and arbitrage pricing arguments like those employed in Modigliani and Miller's capital structure theory and the Black-Scholes option pricing model.

**FNCE 7200-3. Doctoral Seminar: Empirical Research Methods in Finance.** Develops an understanding of current empirical methods used to examine research issues related to corporate finance and the capital markets.

**FNCE 7330-3. Doctoral Seminar: Corporate Finance, Theoretical, and Empirical Issues.** Develops and examines theories and issues in corporate finance. Topics may include corporate control, capital structure, financial signaling, and payout policy.

**FNCE 7550-3. Doctoral Seminar: Special Topics in Finance.** Closely examines areas of specific interest to academic research in finance. Subjects vary and may include game theory, stochastic processes in finance, continuous-time modeling, derivative security pricing, the microstructure of securities markets and financial institutions, innovation, and engineering.

**FNCE 7800-3. Doctoral Proseminar: Finance.** Provides finance doctoral students with an orientation to the finance field; introduces contemporary research perspectives and priorities. Students discuss papers that illustrate academic researchers' use of various disciplinary theoretical and empirical tools to address finance problems.

**FNCE 7830-1. Doctoral Seminar: Dissertation Research.** Assists doctoral students in integrating courses and fields of study in order to apply their knowledge and skills to problems in finance. Gives special attention to development of thesis topics. Continuous enrollment required of all finance doctoral students while doing course work.

**FNCE 8820-3. Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in finance.

**FNCE 8900 (1-3). Independent Study.** Instructor consent and departmental form required.

**FNCE 8990 (1-10). Doctoral Thesis.**

## International Business

**INBU 4200-3. International Financial Management.** Examines the financial policies and problems associated with firms doing business internationally. Topics include the foreign exchange environment, country risk, managing foreign exchange exposure, international working capital management, international capital budgeting, and international financial markets. Prereqs., BCOR 1020, 2000, and 2200. Restricted to students with 52 hours completed.

**INBU 4300-3. International Business and Management.** Exposes students to the concerns and management of international activities that fall largely within functional disciplines. Topics might include overseas market assessment and analysis, marketing internationally, export-import procedures. Prereq., BCOR 2150 or 2300 and 52 hours completed.

**INBU 4900 (1-12). Independent Study.** Prereq., instructor consent. Departmental form required.

**INBU 5100-3. International Business and Marketing.** Same as MKTG 4400.

## Management

**MGMT 3030-3. Critical Leadership Skills.** Provides an opportunity to learn about and practice the skills required of all managers. These skills include leadership, negotiation, conducting performance appraisals, delegation, effective communication, interviewing and making hiring decisions, and managing employees with problem behaviors. Objectives include developing self-awareness of strengths and weaknesses as a manager, gaining familiarity with theory-based skills, and developing proficiency in the use of these skills. Emphasizes experiential learning through group work, role plays, and case analysis. Prereq., BCOR 2150 or 2300. Restricted to students with 52 hours completed.

**MGMT 4000-3. Strategic Management.** Surveys the sources of competitive advantage in a global economy. Discusses principles, frameworks, and techniques that help managers and students understand markets and competitive positioning. Focuses on specific company examples. Provides an interdisciplinary team exploration of the evolving strategies across different industries. Cases are formally presented to an executive panel. Prereqs., BCOR 2150 or 2300 and 52 hours completed.

**MGMT 4010-3. Redefining the Employee-Employer Relationship.** Explores developments in such areas as employee relations law and procedures, employee and employer rights, worker involvement programs, environmental safety and health, and the effects of technology on emerging organization forms. Prereq., BCOR 2150 or 2300. Restricted to students with 52 hours completed.

**MGMT 4020-3. Hiring and Retaining Critical Human Resources.** Allows students the opportunity to practice conducting job analyses and then use this information to develop employee selection and performance appraisal systems. Provides thorough coverage of employers' equal employment opportunity and affirmative action obligations, as well as various approaches to gender, cultural, and ethnic diversity. Prereq., BCOR 2150 or 2300. Restricted to students with 52 hours completed.

**MGMT 4030-3. Managing Employee Reward Systems.** Examines theories of work motivation and relates them to the strategic use of compensation and other reward systems. Topics include procedures for managing base pay; linking pay incentives to productivity at the individual, group, and organizational levels; developing cost-effective programs of employee benefits; and the use of nonfinancial reward systems. Prereq., BCOR 2150 or 2300. Restricted to students with 52 hours completed.

**MGMT 4040-3. Individual, Team, and Organizational Development.** Explores how to determine where an organization needs to focus its development efforts, how to develop and deliver an effective training program, and how to evaluate the impact of development programs on organizational effectiveness. Explores individual, team, and organization-wide development, including such topics as skills training, team building, and managing change. Student teams work with local businesses to practice applying the course material to practical problems. Prereq., BCOR 2150 or 2300. Restricted to students with 52 hours completed.

**MGMT 4070-3. International Operations Management.** Compares systems of production/operations management in the United States with those in Japan, Europe, and Asia. Contrasts various regional and national approaches to business, quality management, labor practices, management styles, international competitiveness, productivity, distribution systems, trade practices, and strategies for penetrating foreign markets. Examines different sociocultural environments, government-business relationships, banking industries, operations strategies, and the potential for transferring industrial management practices and techniques between countries. Prereq., BCOR 2150 or 2300. Restricted to students with 52 hours completed. Same as OPIM 4065.

**MGMT 4080-3. Sustainable Operations.** Addresses important topics in sustainable operations, and how firms use principles of sustainability to reduce costs, add value, and increase competitiveness. Various approaches to reducing waste-streams are considered, including reuse, recycling, recovery, and topics in industrial ecology. Other topics include the role of government regulation and public pressure, comparisons between different national approaches to sustainable operations, individual company programs, and prospects for the future. Prereqs., BCOR 2150 or 2300 and 52 hours completed. Same as OPIM 4075.

**MGMT 4085-3. Project Management Systems.** Acquaints the student with multidisciplinary aspects of project management, including the relationship between schedule, project cost, and performance. Uses qualitative and quantitative tools to facilitate project management skills. Prereqs., BCOR 2150 or 2300 and 52 hours completed. Same as OPIM 4080 and 4850.

**MGMT 4090-3. IT and Business Strategy.** Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success. Prereqs., BCOR 2100 or 2200, BCOR 2150 or 2300. Restricted to business majors with 52 hours completed. Same as OPIM 4040/5040 and TLEN 5140.

**MGMT 4820-3. Topics in Business.** Experimental course offered irregularly for purpose presenting new subject matter in organization management. Same as MGMT 5820.

**MGMT 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Management. Restricted to juniors/seniors.

**MGMT 4850-3. Senior Seminar in Management.** This capstone course builds upon and integrates prior management and business courses, including BCOR 3010, Business Ethics and Society. Using both individual and team assignments, students will develop and apply critical thinking skills towards the socially responsible management of business challenges. Prereqs., BCOR 2300, 3010, MGMT 3030, two 4000-level MGMT courses and 102 hours completed. Restricted to MGMT majors. Formerly BCOR 4003.

**MGMT 4900 (1-3). Independent Study.** Intended only for exceptionally well qualified business seniors. Departmental form required. Prereq., dean and instructor consent.

**MGMT 5820-3. Topics in Business.** Same as MGMT 4820.

## Marketing

**MKTG 3150-3. Sales Management.** Explores the selling task and the essentials of managing the sales force. Includes recruiting, selecting and hiring, training, compensating, supervising, and controlling. Covers sales organization, sales planning, sales forecasting, assigning territories, quotas, and sales analysis. Prereq., BCOR 2400. Restricted to students with 52 hours completed. Formerly MKTG 4150.

**MKTG 3250-3. Buyer Behavior.** Covers both consumer buying behavior and organizational buying behavior. Consumer behavior topics include needs and motives, personality, perception, learning, attitudes, cultural influence, and contributions of behavioral sciences that lead to understanding consumer decision making and behavior. Explores differences between business and consumer markets, business buying motives, the organizational buying center and roles, and the organizational buying process. Required for marketing

majors. Prereq., BCOR 2050 or BCOR 2400. Restricted to students with 52 hours completed.

**MKTG 3350-3. Marketing Research.** Explores fundamental techniques of data collection and analysis used to solve marketing problems. Specific topics include problem definition, planning an investigation, developing questionnaires, sampling, tabulation, interpreting results, and preparing and presenting a final report. Required for marketing majors. Prereqs., BCOR 1020, 2050, or 2400. Restricted to students with 52 hours completed.

**MKTG 3450-3. International Marketing.** Describes the economic, geographic, political, and social forces that have shaped and continue to define global markets. Examines topics critical to success in international markets, including assessment of a firm's international capabilities, techniques for gauging the potential of international markets, international segmentation approaches, and alternative arrangements for entering foreign markets. Compares and contrasts product, price, distribution, logistics, promotion, and research decisions made in global versus domestic markets. Introduces students to financial arrangements characteristic of international marketing, including exchange rates and controls, balance-of-payment principles, import licensing agreements and tariffs. Prereq., BCOR 2400. Formerly MKTG 4400.

**MKTG 4250-3. Product Strategy.** Covers major topics in managing long-term customer relationships that derive from products. Focuses on concepts, analyses, and strategies for existing and new products. Topics include concept development and testing, conjoint analysis, product positioning, brand image measurements and brand management, and product issues in public policy and ethics. Methods of instruction include lectures, case discussions, student group papers and projects, and examinations. Prereqs., MKTG 3250 and 3350. Restricted to juniors/seniors.

**MKTG 4350-3. Services Marketing Strategy.** Designed for those students interested in working in the service industries. Addresses the distinct needs and problems of service organizations in the area of marketing and service quality. Service organizations (i.e., banks, transportation companies, hotels, hospitals, educational institutions, professional services, etc.) require a distinctive approach to marketing strategy—both in its development and execution. Builds and expands on marketing ideas and how to make them work in service settings. Prereqs., MKTG 3250 and 3350.

**MKTG 4500-3. Advertising Management.** Prereqs., MKTG 3250 and 3350. Restricted to students with 52 hours completed.

**MKTG 4550-3. Advertising and Promotion Management.** Analyzes advertising and promotion principles and practices from the marketing manager's point of view. Considers the decision to advertise, market analysis as a planning phase of the advertising program, media selection, public relations, sales promotion, promotion budgets, campaigns, evaluation of results, and agency relations. Prereqs., MKTG 3250 and 3350.

**MKTG 4650-3. Institutional Relationships and Strategy.** Focuses on the management of a firm's relationships with other businesses. Addresses business-to-business marketing strategies, relationships with channel members, and strategic alliances/partnerships. Topics include relationship structures, power, conflict, negotiation, industry analysis, selection of business partners, and managing for long-term stability. Prereqs., MKTG 3250 and 3350.

**MKTG 4810-3. Honors Seminar.** Social responsibilities of the business executive, business ethics, business-government relations, and business in literature. Open to seniors who have completed at least 30 semester hours of business courses with not less than a 3.30 GPA and have instructor consent. Prereq., BCOR 2050 or 2400.

**MKTG 4820-3. Special Topics in Marketing.** Offered irregularly. Provides opportunity for investigation into new frontiers in marketing.

**MKTG 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Marketing. Restricted to juniors/seniors.

**MKTG 4850-3. Senior Seminar in Marketing.** This capstone marketing course integrates and further develops what students have learned in other courses. Provides students with the insight and skills necessary to formulate and implement sound socially responsible marketing strategies, product line management strategies, promotional and product/service communication strate-

gies, pricing, and distribution strategies. Prereqs., MKTG 3250, 3350, two additional 4000-level MKTG courses, and 102 hours completed. Restricted to MKTG majors. Formerly BCOR 4004.

**MKTG 4900 (1-6). Independent Study.** Intended only for exceptionally well qualified business seniors. Instructor and division chair consent required.

**MKTG 6900 (1-3). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**MKTG 6940 (1-3). Master's Candidate.** Departmental form required.

**MKTG 6950 (1-6). Master's Thesis.**

**MKTG 7000-3. Seminar in Consumer Behavior.** Studies the nature and determinants of consumer buying behavior. In-depth investigation of contributions of behavioral sciences (especially psychology, sociology, and cultural anthropology) toward understanding consumer behavior. Influence of demographic factors, motivation, personality, culture, and purchasing behavior. Prereq., instructor consent.

**MKTG 7200-3. Experimental Research Methods in Marketing.** Provides a detailed exposure to the design of laboratory/field experiments and quasi-experiments for marketing and consumer research. Emphasizes the choice of design options, data collection methods, statistical analysis, and substantive interpretation of experimental results.

**MKTG 7300-3. Multivariable Methods in Marketing Research.** Includes MANOVA designs, causal models, cluster analysis, discriminant function analysis, factor analysis, and latent structure analysis. Emphasizes computer applications. Prereqs., graduate courses in regression and MANOVA.

**MKTG 7305-3. Qualitative and Survey Research Methods in Business.** Detailed exposure to qualitative and survey research methods in business. Qualitative methods include participant observation, depth interviews, focus-group interviews and ethnography. Survey methods include measurement theory, survey design and sampling, survey implementation, data analysis, and substantive interpretation.

**MKTG 7310-3. Design and Analysis of Experiments in Business.** Detailed exposure to experimental research methods for business applications. Emphasizes the choice of design options, data collection methods, statistical analysis, and substantive interpretation of experimental results.

**MKTG 7400-2. Doctoral Seminar: Channels of Distribution.** Study of marketing literature in channels of distribution. Includes topics of channel structure, channel power, channel conflict and leadership, physical distribution systems, and regulation.

**MKTG 7500-2. Doctoral Seminar: Promotion.** Study of marketing literature dealing with advertising, selling, sales promotion, and sales management. Includes topics of advertising decision models, advertising effects, sales-force performance models, and promotion management.

**MKTG 7600-3. Doctoral Seminar: Services Marketing.** Study of marketing literature dealing with services. Includes such topics as service management, theoretical issues in the study of services, and strategies in travel, tourism, recreation, and financial services industries.

**MKTG 7800-3. Doctoral Proseminar: Marketing.** Provides marketing doctoral students with an orientation to the marketing field and introduces contemporary research perspectives and priorities. Students discuss papers that illustrate academic researchers' use of various disciplinary perspectives to address marketing problems and the range of theoretical and empirical methods used.

**MKTG 7805-3. Doctoral Seminar: Economic and Administrative Science Approaches to Research in Marketing.** Examines marketing management and consumer behavior issues from the vantage of economics and organizational theory. One segment of the course focuses on theoretical and empirical analysis of the means by which utility-maximizing consumers learn about consumption environment and respond to firms' marketing decisions. Another segment examines research on firms' competitive strategy and marketing mix decisions and explores how organizational sociological factors influence these decisions.

**MKTG 7810-3. Doctoral Seminar: Psychological Approaches to Research in Marketing.** Examines the basic psychological processes that underlie com-

mon marketing phenomena. Topics include memory and judgment, persuasion, attitude-behavior consistency, information processing, automatic and controlled processes, learning, motivation and cognition, social judgment, and the role of affect and mood on judgment. Discusses topics in consumer behavior and marketing management contexts, in conjunction with related methodological issues.

**MKTG 7815-3. Doctoral Seminar: Consumer and Managerial Decision Making in Marketing.** Examines judgment and decision making research pertinent to understanding how consumers and marketing managers make decisions. Uses economic models as a normative backdrop for examining research on decision heuristics, judgment and choice anomalies, and contingent decision behavior. Examines processes of causal judgment and inference and the influence of a variety of contextual factors (including time) on judgment and decision.

**MKTG 7820-3. Doctoral Seminar: Sociological and Anthropological Approaches to Research in Marketing.** Inquires into substantive and methodological issues concerning postmodern consumer research. Attains depth in a few areas while also providing a framework in which to situate other substreams of research. Uses ethnography, semiotics, literary analysis, and other interpretive methods to examine topics such as brand and store loyalty, atmospheric and shopping dynamics, creation of brand meanings, and other marketplace behaviors.

**MKTG 7825-3. Doctoral Seminar: Empirical Models in Marketing.** Presents state-of-the-art empirical modeling techniques (both reduced-form and structural) used by marketing scientists, as well as discuss the key findings generated from major empirical studies. Acquaint the class participants with the systematic process of conducting rigorous empirical marketing research, enable them to read and critically review empirical papers in leading marketing journals and, ultimately, start doing independent empirical research. Prereq., a graduate course in regression.

**MKTG 7830-3. Doctoral Seminar: Dissertation Research.** Assists doctoral students in integrating courses and fields of study in order to be able to apply knowledge and skills to problems in marketing. Gives special attention to development of thesis topics.

**MKTG 8820 (1-6). Doctoral Seminar: Special Topics.** Studies marketing literature on a topic or topics selected by instructor. Examples include marketing history, international marketing management, marketing environment, marketing of high technology products, and marketing models.

**MKTG 8900 (1-3). Independent Study.** Requires consent of instructor under whose direction study is taken. Departmental form required.

**MKTG 8990 (1-10). Doctoral Thesis.**

## Operations and Information Management

**OPIM 2010-3. Business Application Programming.** Uses computer programming to teach a complex problem solving skill. Objectives are: (1) learn to use a structured problem decomposition method, designed to help decompose a complex problem into manageable sub-problems. This method is best exemplified in programming but is applicable to any complex business problem. (2) understand the core concepts of programming such as variable, object model, and control flow—that will help not only appreciate the power of programming behind modern technologies but also better understand business process models Formerly SYST 2010.

**OPIM 3000-3. Systems Thinking.** Introduces systems thinking and the analysis of the interactions of a complex collection of people, processes, organizations, and technologies. Students learn to be creative and critical thinkers who can conceptually model very complex systems. Prereqs., BCOR 1010, 1020, and 52 hours completed. Formerly SYST 3000.

**OPIM 3030-3. Management of Service Operations.** Examines concepts, tools, and techniques used in the management of service operations. Focuses on how firms add value and compete with high quality and efficient services. Emphasizes the use of models for designing new services and improving the effectiveness of service processes. Studies the application of technology in the context of productivity, growth, and the globalization of services. Pre-

reqs., BCOR 1010, 1020, 2500, and 52 hours completed. Same as OPIM 6030. Formerly SYST 3030.

**OPIM 3100-3. Business Intelligence.** Focuses on accurate and timely knowledge to make effective operational, tactical and strategic decisions. This course focuses on how to create and use such knowledge. Topics include problem definition; critical factor isolation; data collection, storage, and querying; transformation of data into knowledge through appropriate analyses and aggregation; and the presentation of the knowledge to decision makers in meaningful ways. Prereqs., BCOR 1010, 1020, and 2500. Recommended prereq., OPIM 3000. Formerly SYST 3100.

**OPIM 3101-3. Business Technologies.** Covers major technologies that underlie today's businesses and e-Commerce, including but not limited to WWW technologies. Emphasizes the security privacy issues and solutions at multiple levels of network, systems, personal, organization, and inter-organizational commerce. Aims to help students better understand and evaluate technology-related issues, alternatives, and tradeoffs. Provides core technology background for students entering a technology-related field. Prereqs., BCOR 1010, 1020, and 2500. Formerly SYST 3101.

**OPIM 4040-3. IT and Business Strategy.** Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success. Prereqs., BCOR 1010, 1020, and 2500, and 52 hours completed. Same as OPIM 5040, MGMT 4090, and TLEN 5140. Formerly SYST 4040.

**OPIM 4050-3. Supply Chain Management.** Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses, and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chain cost subject to service requirements imposed by a variety of industries. Prereqs., BCOR 1010, 1020, 2500, and 52 hours completed. Same as MBAX 6460. Formerly SYST 4050.

**OPIM 4060-3. Managing Business Processes.** Covers the concepts and tools to design and manage business processes. Emphasizes modeling an analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prereqs., BCOR 1010, 1020, 2500, and 52 hours completed. Same as OPIM 5060. Formerly SYST 4060.

**OPIM 4065-3. International Operations Management.** Compares systems of operations management in the United States with those in Japan, Europe, Asia, and South America. Contrasts various regional and national approaches to business, quality management, labor practices, management styles, international competitiveness, productivity, distribution systems, trade practices, and strategies for penetrating foreign markets. Examines different sociocultural environments, government-business relationships, banking industries, operations strategies, and the potential for transferring operations management practices and techniques between countries. Prereqs., BCOR 2150 or 2300 and 52 hours completed. Same as MGMT 4070.

**OPIM 4075-3. Sustainable Operations.** Addresses important topics in sustainable operations, and how firms use principles of sustainability to reduce costs, add value, and increase competitiveness. Various approaches to reducing waste-streams are considered, including reuse, recycling, recovery, and topics in industrial ecology. Other topics include the role of government regulation and public pressure, comparisons between different national approaches to sustainable operations, individual company programs, and prospects for the future. Prereqs., BCOR 2150 or 2300 or 2500 and 52 hours completed. Same as MGMT 4080.

**OPIM 4080-3. Project Management Systems.** Acquaints the student with multidisciplinary aspects of project management, including the relationship between schedule, project cost, and performance. Uses qualitative and quantitative tools to facilitate project management skills. Prereqs., BCOR 1010, 1020, 2500 and 52 hours completed. Same as OPIM 4850 and MGMT 4085. OPIM major students should not take this course. Formerly SYST 4080.

**OPIM 4510-3. Design of Usable Business Systems.** Focuses on the usefulness and usability of systems in organizations. Examines the bottom line implications of information systems and how to create systems that are easy to use for all potential users. Creative and critical thinking to design and build systems

are stressed through individual and team exercises. Prereqs., BCOR 1010, 1020, 2500 and 52 hours completed. Same as OPIM 5510. Formerly SYST 4510.

**OPIM 4820-3. Special Topics in Operations and Information Systems.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in operations and information management. Formerly SYST 4820.

**OPIM 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in operations and information management. Restricted to juniors/seniors.

**OPIM 4850-3. Senior Seminar in Operations and Information Management.** Acquaints the student with multidisciplinary aspects of project management, including the relationship between schedule, project cost, and performance. Uses qualitative and quantitative tools to facilitate project management skills. Prereqs., BCOR 2500, 102 hours completed, and two 4000-level OPIM courses. Restricted to OPIM majors. Same as OPIM 4080 and MGMT 4085. Formerly BCOR 4005.

**OPIM 4900 (1-3). Independent Study.** Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well-qualified business seniors who desire to study an advanced topic. Departmental form required. Formerly SYST 4900.

**OPIM 4910 (1-3). Academic Internship in Operations and Information Management.** Offers students the opportunity to gain professional work experience in an operations or information management position while still in school. Provides academically relevant work experience that complements students' studies and enhances their career potential. Includes 100 hours per credit and a course paper. Students may not pre-register for this course, and they must contact the faculty advisor for the OPIM area for approval. Prereq., at least 60 hours of course work completed and instructor consent. Formerly SYST 4910.

**OPIM 5040-3. IT and Business Strategy.** Same as OPIM 4040, MGMT 4090 and TLEN 5140. Formerly SYST 5040.

**OPIM 5060-3. Managing Business Processes.** Same as OPIM 4060. Formerly SYST 5060.

**OPIM 5510-3. Design of Usable Business Systems.** Same as OPIM 4510. Formerly SYST 5510.

**OPIM 6030-3. Management of Service Operations.** Same as OPIM 3030. Similar to EMEN 5040. Formerly SYST 6030.

**OPIM 6070-3. Survey of Operations Research.** Applications oriented survey of operations research topics including linear and integer programming, network analysis, dynamic programming, nonlinear programming, decision analysis, Markov chain and Markovian decision models, queuing theory, and simulation. Same as EMEN 5600. Formerly SYST 6070.

**OPIM 6080-3. Operations Management.** Covers demand forecasting, capacity management, scheduling, inventory planning and management, production planning and control, materials requirements planning, just-in-time production systems, product design and process selection, elements of statistical process control, service operations, and quantitative techniques for operations decision making. Similar to EMEN 5500. Formerly SYST 6080.

**OPIM 6820-3. Special Topics in Systems.** Offered irregularly to provide opportunity for investigation into new frontiers in systems. May be repeated up to 6 total credit hours. Formerly SYST 6820.

**OPIM 6900 (1-3). Independent Study.** Requires prior consent of dean and instructor under whose direction study is taken. Intended only for exceptionally well-qualified business seniors who desire to study an advanced topic. Departmental form required. Formerly SYST 6900.

**OPIM 6930-3. Assessing Sustainable Energy Technologies.** Focuses on the commercialization prospects of emerging energy technologies, including solar, wind, biomass, oceanic, geothermal, hydropower, fuel cell (hydrogen), nuclear, and other more exotic energy sources. Investigates the technology feasibility, economic viability, and progress of each technology, as well as its economic opportunities and challenges.

**OPIM 6940 (1-4). Masters Candidate.**

**OPIM 6950 (1-6). Master's Thesis.**

**OPIM 7110-3. Simulation Modeling and Analysis.** Introduces the concepts of simulation modeling. Provides practical experience with real examples using

popular commercial simulation packages such as Arena or Extend. Emphasizes discrete-event simulation but also covers topics in Monte Carlo simulation and system dynamics. Practical examples from operations management, manufacturing, and services are used to give students an appreciation for the wide scope of application and the robust nature of simulation modeling in the context of decision making. Formerly SYST 7110.

**OPIM 7120-3. Discrete Optimization.** Covers the modeling and solution of discrete problems that arise in business and engineering. Classical techniques such as cutting planes and branch and bound are covered. Emphasizes the application of metaheuristic procedures, such as tabu search and evolutionary approaches, to the solution of practical combinatorial optimization problems. Formerly SYST 7120.

**OPIM 7330-3. Advanced Operations Management Modeling.** Covers concepts, models, and solution techniques relevant to the management of the processes required to provide goods or services to consumers. Emphasizes supply chain systems topics such as production, inventory, distribution, and scheduling. Management science and operations research methodology is also applied to problems such as facility capacity planning, facility design, and location analysis. Formerly SYST 7330.

**OPIM 7800-3. Doctoral Proseminar in Systems.** Provides systems doctoral students with an orientation to current research and the academic discipline in operations and information systems. Familiarizes students with key schools of thought in the field, provides background on reference disciplines, examines significant research streams, and helps students begin developing their own area of interest. Formerly SYST 7800.

**OPIM 7805-3. Foundations of Research in Information Systems.** Examines foundations of information systems research, including classic readings in information systems and its reference disciplines, different research approaches, processes of research, and classic and contemporary readings in major topics in information systems. Prereq., PhD standing or instructor consent. Formerly SYST 7805.

**OPIM 7810-3. Technical Topics in Information Systems Research.** Examines in depth a selection of topics in technical areas of information systems. Includes theoretical perspectives for technical topics, critical perspectives on past and current research, appropriate methods for examining technical topics, and development of students' ability to identify and develop research topics in technical areas. Prereq., PhD standing or instructor consent. Formerly SYST 7810.

**OPIM 7815-3. Behavioral Topics in Information Systems Research.** Covers both basic and advanced topics. Develops skill in designing, evaluating, and understanding both quantitative and qualitative research methods. Includes the development of research proposals, making and justifying methodological choices, writing research reports, and understanding how to publish in information systems. Prereq., PhD standing or instructor consent. Formerly SYST 7815.

**OPIM 7820-3. Advanced Research in Information Systems.** Examines advanced topics in information systems research, focusing on the electronic era and eBusiness. Examines foundations of eBusiness, including basic technical, organizational, and behavioral foundations. Covers leading edge research from both topical and methodological perspectives. Focuses on methods appropriate for studying eBusiness and examines future research directions. Prereq., PhD standing or instructor consent. Formerly SYST 7820.

## Master of Business Administration Courses

### MBA: Core Courses

*Open only to MBA students. Non-MBA students seeking to enroll in noncore courses must meet the prerequisite requirements and have the consent of both the instructor and the director of the MBA program. Across all business areas, MBA students have enrollment priority for courses with an MBA prefix. Non-MBA students seeking to enroll in the noncore courses must meet the prerequisite requirements. Other elective options for MBA students may be found in the main business course descriptions.*

**MBAC 6000-3. Socially Responsible Enterprise.** Investigates the relation between business and society by drawing on theories from ethics, sociology,

economics, political science, and philosophy and applying these theories to specific business contexts. Gives managers an understanding of how broader societal issues can affect business decisions. Emphasizes case studies of current business practices.

**MBAC 6010-3. Managerial Economics.** Studies the elements of the business firm's fundamental problem—how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course.

**MBAC 6011 (1.5). Managerial Economics 1.** Studies the elements of the business firm's fundamental problem—how to maximize profits. Develops for each element managerial theory based upon introductory and intermediate-level microeconomics. Analyzes various applications and misapplications of the relevant concept, primarily through case studies. Differential calculus and statistics are used throughout the course.

**MBAC 6012 (1.5). Managerial Economics 2.** See MBAC 6011.

**MBAC 6020-3. Financial Accounting.** Introduces the financial reporting system used by business organizations to convey information about their economic affairs. Develops an understanding of financial reports and what they tell about a business enterprise. Focuses on how alternative accounting measurement rules represent different economic events in financial reports.

**MBAC 6030-3. Quantitative Methods.** Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate-level treatment of descriptive statistics, probability, probability distributions, sampling theory and sampling distributions, and statistical inference (estimation and hypothesis testing). Provides an introduction to regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers, and nonparametric methods.

**MBAC 6031-1.5. Quantitative Methods.** Covers foundations for statistical reasoning and statistical applications in business. Topics include graduate-level treatment of descriptive statistics, probability, probability distributions, sampling theory, sampling distributions, and statistical inference (estimation and hypothesis testing). Provides an introduction to regression analysis, analysis of variance, time series forecasting, decision analysis, index numbers and nonparametric methods.

**MBAC 6040-3. Management Behavior in Organizations.** Develops an awareness of the impact of individual and group processes on effective organizational functioning, an understanding of the impact of behavioral concepts, and practices their application through discussion and experiential learning.

**MBAC 6050-3. Corporate Strategy.** Experience the real-world problems facing general managers while enhancing skill at solving complex, real-business problems in strategy. Blends functional with strategic management and introduces students to the best new thinking in strategy. Integrates previous MBA learning, and instills a broadened perspective, competence, and familiarity with good practice in strategic management.

**MBAC 6060-3. Corporate Finance.** Analyzes the implications of modern finance theory for the major decisions faced by corporate financial managers. Develops the basic skills necessary to apply financial concepts to the various problems faced by a firm. Includes capital budgeting, capital structure, long term financing, short term financial management, and financial planning topics. Prereq., MBAC 6020.

**MBAC 6080-3. Decision Modeling and Applications.** Integrates topics from decision analysis and operations management as they relate to modeling management decisions. Field projects involve the university, local companies, and/or government agencies. Prereq., MBAC 6030.

**MBAC 6090-3. Marketing Management.** Provides a solid foundation of marketing knowledge by focusing on principles of marketing. Introduces the role that marketing cases play in advancing understanding and skill development in the field of marketing. Case discussions illustrate concepts discussed, and case studies are used to introduce the marketing decision making process. Emphasizes the international nature of marketing, as well as the importance of analysis and the understanding of the economic, demographic, political-legal-regulatory, sociocultural, technological, and natural environments. Prereq., MBAC 6030.

**MBAC 6097-2. Business Simulation Seminar.** Uses interactive, competitive, computer-based simulation designed to illustrate the process of implementing a strategy in a changing, technology-driven environment. The simulation uses advanced computer algorithms to create a market-driven business environment where customer preferences change, market segments shift, competitors emerge, technologies advance, and company fortunes rise and fall—depending on the decisions the student teams make. Prereqs., MBAC 6000, 6010, 6020, 6030, 6040, and 6080.

**MBAC 6098-1. Business Writing.** Develops business writing skills, with specific focus on style rather than content. Assists students in improving their writing skills in order to be effective communicators in their professional careers.

**MBAC 6099 (1.5). Professional Development.** Develops presentation and interview skills to help students become effective communicators in their professional careers and to acquaint themselves well in the job placement process.

## MBA: Entrepreneurship

**MBAX 6100-3. Entrepreneurship and Small Business.** Examines the environments of entrepreneurial firms from start-up to development of ventures. Allows students to assess their fit with entrepreneurial firms. Key element is learning the process of determining the difference between ideas and commercializable opportunities through feasibility analysis and plans. Prereq., MBAC 6020 or instructor consent.

**MBAX 6110-3. Entrepreneurial Finance.** Addresses a variety of topics including financial valuation, various sources of funds, structures and legal issues in arranging financing, the private and public venture capital markets, and preparation for, and execution of, an initial public securities offering. Prereq., MBAC 6020.

**MBAX 6120-3. Entrepreneurial Marketing.** Addresses the marketing challenges that face the entrepreneur or start up firm with a limited budget. From initially positioning the company and its products to marketing that position to key shareholders for a new venture, to establishing channels of distribution and reaching the consumer, take a specialized look at the development and implementation of a marketing plan.

**MBAX 6130-3. Sustainable Business Ventures.** Focuses on environmentally sustainable business ventures as well as issues associated with starting and operating a business that solves natural environmental challenges while achieving profitability. Includes a number of case studies, topical discussions, talks by environmental entrepreneurs, and an applied or library research project.

**MBAX 6170-3. Business Plan Preparation.** Completion of a sophisticated business plan within task groups from concept through all the elements of a professionally written business plan. Provides students high interaction with businesses and entrepreneurs. Prereq., MBAC 6020 and MBAX 6100, or instructor consent.

**MBAX 6180-3. Startup Execution.** Covers a variety of topics in applied entrepreneurship, including the steps required to legally launch a business and procedures for executing standard business functions (organization, marketing, sales, advertising, operations, team building, and finance) with minimal resources (cash, personnel, and equipment).

**MBAX 6190-3. Projects in Entrepreneurial Companies.** Limited to 12 students per section, each student is matched with an entrepreneurial company to complete a project that is key to company strategy. Students experience total company environment from the top management level through attending management meetings and interacting with cross-functional managers and employees. E-mail and face-to-face meetings result in discussing opportunities and issues resulting from experiences in companies. Prereq., MBAX 6100.

**MBAX 6805-3. Entrepreneurship and the Venture Capital Process.** This course will be articulated into two main parts, tightly interrelated: Entrepreneurship and the Venture Capital Process. The first part has the objective to lead the students to understand what venture capital is, how it works, how you structure capital raising, and how it helps entrepreneurial initiatives. The second part concerns how venture capitalists manage their operations, secure investment deals, and maintain their portfolios. Prereqs., MBAC 6011,

6020, 6031, 6040, 6060, 6080, and 6090. Restricted to LAWS students and graduate students in business.

**MBAX 6825-3. Sustainable Business.** Exposes students to an overview of concepts related to challenges of meeting interests of stakeholders so to balance social, environmental, and economic resources and impacts. Will provide students an introduction to the diversity of sustainability-related topics relevant to today's business managers and entrepreneurs. Students will investigate avenues for using market strategies to build a path toward global sustainability. Prereq., 1st semester MBA core courses.

**MBAX 6845-3. Social Entrepreneurship in Emerging Markets.** Social entrepreneurs adopt business approaches to solving global, social, and environmental problems that have not been effectively addressed by government, business or traditional nonprofits. This course provides a framework for student teams to assist social entrepreneurs in developing countries, helping them achieve their social mission while operating sustainably and with measurable impact. Prereq., MBAC 6010, 6060 and 6090. Recommended prereq., MBAX 6170.

## MBA: Finance

**MBAX 6200-3. Advanced Corporate Finance.** Covers the theory of asset pricing, which is then applied to capital budgeting, capital structure choice, mergers and acquisitions, and risk management. Prereq., MBAC 6060.

**MBAX 6210-3. Applied Financial Management.** Analyzes the financial condition, planning, and control of current assets, current liabilities, and long-term financial arrangements. Topics include financial planning, managing working capital, short- and long-term financing, capital budgeting, valuation, and capital structure policies. Case studies are emphasized. Prereq., MBAC 6060.

**MBAX 6220-3. Investment Management and Analysis.** Covers managing investment portfolios by blending academic theories and evidence with practitioner experience. Topics include risk and return relationships, securities, value theory (capital asset, arbitrage, and option pricing), portfolios, and performance evaluations. Prereq., MBAC 6060.

**MBAX 6230-3. International Financial Management.** Examines the financial procedures, policies, and risks faced by firms conducting business internationally. Topics include examining the international finance environment, managing foreign exchange risk exposure, managing international working capital, conducting analysis, and developing an understanding of international financial markets. Prereq., MBAC 6060.

**MBAX 6240-3. Financial Markets and Institutions.** Deals with the economics of financial markets and the management of financial institutions. Covers factors influencing the cost and availability of capital for financing business firms. Examines both domestic and international markets and institutions. Prereq., MBAC 6060.

**MBAX 6250-3. Derivative Securities.** Derivatives, like options, futures, forwards, and swaps, encompass all aspects of finance. Topics cover the characteristics, valuation, and trading strategies associated with derivatives as well as their use in risk management. Prereq., MBAC 6060.

**MBAX 6260-3. Fixed Income Investing.** Fixed income securities are those that nominally promise a fixed stream of payments. They include government and corporate long and short term debt issues that far exceed the amount of corporate stock issues, as well as long term personal debt (i.e., home mortgages). Develops practical analytical tools for describing these securities, the markets where they are traded, and their purchase and management by financial intermediaries. Stresses the huge market for U.S. government debt, because it provides a foundation for the development of more specialized tools used in other markets. Prereq., MBAC 6060.

**MBAX 6885-3. Interpreting the Economic Environment.** The macroeconomic environment is vitally important to business managers regardless of their area of focus. Most macroeconomic events portend future economic changes that influence business and/or industry. Develops a basic understanding of the macroeconomy and its relationship to an individual business or industry through understanding macroeconomic concepts and data sources, developing a basic model, understanding relevant policy instruments, and integrating this information into the global economy. Prereq., MBAC 6010.

## MBA: Marketing

**MBAX 6300-3. Marketing Communication.** Focuses on the strategic and decision making aspects of marketing communication from a managerial perspective. Increases students' understanding of specific decision elements within an integrated marketing communications framework. Topics include promotional objectives, agency relations, media selection, budgeting, and advertising research. Also explores relevant advertising models and the economic and social effects of promotional activity. Prereq., MBAC 6090.

**MBAX 6310-3. Marketing Strategy.** Marketing strategy has developed into an increasingly critical managerial activity as businesses recognize the importance of creating customer value and being customer oriented. Discusses key elements of successful marketing strategy including market/customer analysis and competitor analysis, and identifies strategic approaches managers may adopt to succeed in today's highly competitive and rapidly changing business environment. Prereq., MBAC 6090.

**MBAX 6320-3. International Marketing Management.** Develops skills and analyzes frameworks for selecting competitive strategy and building implementable marketing programs in contemporary global markets. A team project provides students with experience in researching international markets to assemble a product-market entry plan. Prereq., MBAC 6090.

**MBAX 6330-3. Marketing Intelligence.** Market Intelligence is a decision-oriented course geared toward gathering, analyzing, and interpreting data about markets and customers. Students learn how to: define the marketing problem and determine what information is needed to make the decision; acquire trustworthy and relevant data and judge its quality; analyze the data and acquire the necessary knowledge to make certain classic types of marketing decisions. Prereq., MBAC 6090.

**MBAX 6340-3. Marketing Field Project.** Develops skills in marketing decision making. Teams design and complete a project located at a client business or other organization in the metropolitan area. Team members organize and assign responsibilities, interact with middle- and top-level managers, apply quantitative and behavioral tools presented in marketing and other courses, meet deadlines, and present results of project activities. Prereq., MBAC 6090.

**MBAX 6350-3. Marketing of High Technology.** Marketing in high technology environments poses its own unique challenges due to the complexity and novelty of the technology. Challenges include articulation of the value proposition, decision making with limited information on customers, and coordination with other market players. To succeed in this environment, firms need to be able to understand unarticulated needs, forecast the development of nascent markets, and position themselves appropriately in the competitive landscape. Focus will be on the strategy to accompany a technology and not on the technical or scientific aspects of the product.

**MBAX 6360-3. New Product Development.** Provides a better understanding of the new-product development process, highlighting the inherent risks and strategies for overcoming them. Using a combination of lectures, cases, and a project, this course examines the process of designing, testing, and launching new products. Emphasizes the interplay between creativity and analytical marketing research throughout the development process. Also covers branding issues, such as brand extensions and their impact on brand equity. Prereq., MBAC 6090.

## MBA: Systems

**MBAX 6410-3. Business Process Design.** Covers the concepts and tools to design and manage business processes. Emphasizes modeling and analysis, information technology support for process activities, and management of process flows. Graphical simulation software is used to create dynamic models of business processes and predict the effect of changes. Prepares students for a strong management or consulting career path in business processes.

**MBAX 6420-3. IT and Business Strategy.** Although some companies are very successful are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoptions efforts to success.

**MBAX 6460-3. Supply Chain Management.** Explores the key issues related to the design and management of supply chains. Covers the efficient integration of suppliers, production facilities, warehouses, and stores so that the right products in the right quantity reach customers at the right time. Focuses on the minimization of the total supply chain cost subject to service requirements imposed by a variety of industries. Recommended prereq., MBAC 6080. Same as OPIM 4050. Formerly MBAX 6865.

## MBA: Management

**MBAX 6440-3. Project Management.** Acquaints students with multidisciplinary aspects of project management, including the relationship between schedule, cost and performance. The course uses a hands-on project where the student interacts with a real customer, providing an opportunity to utilize the qualitative and quantitative tools taught in the classroom. At the conclusion of the course, the student may be eligible to apply for a project management certification from Project Management Institute based on previous work experience.

**MBAX 6450-3. International Operations Management.** Takes a broad comprehensive perspective on managing and operating in a rapidly growing global economy. Explores regional and national approaches to international operations including trade practices; penetration strategies; financial, marketing, services, and manufacturing operations; ethical and sustainability issues; and global competitive strategy. Compares global business practices in Asia, South America, Europe, and Africa.

**MBAX 6500-3. Management of Organizational Change.** Explores ways to improve organizations to meet demands of changing environments. Emphasizes theoretical framework and models of organization change, barriers to implementing change and ways to overcome them, and the roles of the change agent and/or consultant. Prereq., MBAC 6040.

**MBAX 6530-3. Negotiating and Conflict Management.** Explores and builds skills for conflict management and negotiation problems faced by managers (e.g., dealing with subordinates, peers, superiors, or clients). Content is relevant to all MBA students, especially those interested in management, accounting, entrepreneurship, finance, and marketing. Prereq., MBAC 6040.

**MBAX 6540-3. Consulting Skills.** Provides an integrative, hands-on exercise in managing change. Develops skills in contracting, collecting, and analyzing data, and writing reports. Teams practice these skills by conducting an organizational diagnosis, consulting project within an organization. Prereq., MBAC 6040.

**MBAX 6550-3. Management of Technology and Innovation.** Examines a variety of issues common to management of technology, such as technology strategies, methods of technology transfer, selecting technology standards, managing the research and development process, and encouraging and rewarding innovation.

**MBAX 6560-3. Executive Leadership.** Examines organizational leadership from the executive perspective, including private and public sector firms, and non-profits. Studies how executives lead change and innovation, interact with the top management team, and deal with the board of directors. Topics include governance of the firm, strategies for enhancing executive influence, assessing and understanding diverse leadership styles, and the ethics and responsibilities of an executive. Formerly MBAX 6890.

**MBAX 6801-3. Global Perspectives Seminar.** Provides students with an in-depth perspective about a specific country or region outside the United States. The course can focus on a different region or country each time it is offered. If demand for this type of experience is strong, multiple sections of the course could be offered in a given semester, each focusing on a different region or country. The choice of region and the specific focus of each course would depend on the faculty member teaching the course. May be repeated up to 6 total credit hours. Prereqs., MBAC 6010, 6060 and 6090.

## MBA: Real Estate

**MBAX 6600-3. Real Estate Development.** Studies methods of analyzing real estate opportunities, local government controls and regulations of the Development Process. Majority of class material is provided via case studies and

guest lecturers. Last portion of the course will be the presentation of student group projects.

**MBAX 6610-3. Real Estate Finance and Investment Analysis.** Objectives of the course are to conduct income property investment analysis; to develop the technical competence necessary to structure real estate transactions; and to understand the financial assets securitized by real estate. Students will analyze income properties using Excel spreadsheets and ARGUS Financial Software. Techniques for structuring real estate transactions examined in this course include lender participations, sale-leasebacks, joint ventures, and real estate syndications. Prereq., MBAX 6600 or equivalent, or instructor consent.

**MBAX 6620-3. Real Estate Project Competition.** Develops skills in real estate decision making. Teams design, complete, and present a real estate project in a competition forum. Students gain an understanding and working knowledge of real estate, use a piece of real property to determine its highest and best use, create a sales plan, and prepare a real estate financing package. Team members organize and assign responsibilities, interact with real estate professionals, and apply appropriate quantitative and qualitative tools and procedures. Prereqs., MBAX 6600 and 6640, or equivalent, or instructor consent.

**MBAX 6630-3. Real Estate Economics.** Examines real estate market operations and discusses alternative methodologies for estimating real estate values. Examines various theories of land price determination and uses these models to understand how the private market allocates land to competing residential, office, retail, industrial/warehouse, hotel, and other end users. Examines how factors influencing the demand for real estate interact with the supply of real estate to determine market rents and how the flow of future expected income is capitalized to yield the market price of the asset. Prereqs., MBAC 6011 and MBAC 6060. Formerly MBAX 6835.

**MBAX 6640-3. Real Estate Law.** Examines the legal issues associated with developing, acquiring, transferring, and leasing real property. Topics include real estate contracts, land use and development agreements, vehicles for owning real estate, real estate covenants, conditions and restrictions, loan transactions, negotiating real estate contracts, commercial leases and real estate taxation. Material for this course will consist of assigned articles and real estate cases. Prereq., MBAX 6600 or equivalent, or instructor consent. Formerly MBAX 6855.

**MBAX 6815-3. Survey of Best Practices in Sustainable Real Estate Development.** Explores techniques, processes, tools, and capabilities required to manage growth and land use change in the light of shifts beginning to transform the way we approach land use and real estate development.

**MBAX 6966-3. Independent Study-Real Estate.** Independent study in the field of real estate.

## MBA: Accounting

**MBAX 6700-3. Corporate Financial Reporting.** Provides an in-depth study of the concepts underlying contemporary financial accounting practice. Includes preparation and analysis of financial statements and the application of concepts to selected current issues. Prereq., MBAC 6020 or equivalent. Same as ACCT 6220.

**MBAX 6710-3. Financial Statement Analysis.** Focuses on the use of accounting information by decision makers external to the firm. Considers judgments made by security analysts, bank lending officers, and auditors. Emphasizes credit scoring, risk analysis, and equity valuation. Prereq., MBAC 6020 or equivalent. Same as ACCT 6250.

## MBA: Operations and Production Management

**OPMG 6900 (1-3). Independent Study.**

**OPMG 6940 (1-4). Master's Candidate.**

**OPMG 6950 (1-6). Master's Thesis.**

**OPMG 8990 (1-10). Doctoral Thesis.**



## Organization Management

**ORMG 7310-3. Seminar on Organizational Behavior.** Doctoral level seminar covering such issues as leadership, job attitudes, motivation, absenteeism, turnover, goal setting, and group dynamics. Prereq., instructor consent.

**ORMG 7320-3. Seminar in Organization Theory.** Critically investigates major issues in organization theory and provides students with experience in comprehensively surveying literature in subject areas such as organization design, power, culture, innovation, technology, environment, size, and strategy. Instructor consent required.

**ORMG 7330-3. Seminar and Practicum in Organization Development.** Provides a doctoral level seminar emphasizing intervention theory and method in effectuating organizational change in a client system. Deals with group development, educational processes, conflict resolution, organizational interventions, change strategies, and ethical and skill requirements of the consultative role. Prereq., instructor consent.

**ORMG 7800-3. Doctoral Proseminar: Management.** Provides an orientation to doctoral level study for all students in management. Through critical analysis of articles and student and faculty presentations, students learn about reading and writing research articles and gain an overview of the management discipline.

**ORMG 7830-3. Doctoral Seminar: Dissertation Research.** Considers philosophical topics and concepts related to the social sciences and examines various methodologies relevant to business and dissertation research.

**ORMG 8820 (1-4). Graduate Seminar.** Provides opportunity for investigating new frontiers in organization management through an experimental seminar (offered irregularly).

**ORMG 8900 (1-3). Independent Study.**

**ORMG 8990 (1-10). Doctoral Thesis.**

## Personnel/Human Resource Management

**PHRM 7400-3. Seminar in Personnel Human Resource Management.** Provides an intensive research-based survey of contemporary issues in personnel-human resource management. Survey literature and conduct research in personnel/human resource subject areas such as performance appraisal, pay strategy, human resource strategy, employee turnover, employment testing, and human capital. Prereq., instructor consent.

## Real Estate

**REAL 3000-3. Principles of Real Estate Practice.** Covers principles of real estate from a value approach for both commercial and residential real estate. Includes legal terms and issues; government control of real estate; market valuation and appraisal; financing real estate; basic investment analysis; contracts and brokerage; and basic taxation of real estate. Prereq., BCOR 1010, 1020, 2000, 2200, and 52 hours completed.

**REAL 4000-3. Real Estate Law and Financing Instruments.** Covers estates in land, purchase and sales contracts, conveyances, mortgage and trust deed transactions, property taxes, and leases. Prereq., REAL 3000.

**REAL 4100-3. Real Estate Finance and Investment Analysis.** Covers the link between real estate and the capital markets through an examination of the financial institutions and instruments used to finance real property. Examines methods used to analyze value in real property investments. Prereq., REAL 3000.

**REAL 4810-3. Real Estate Academic Internship.** Students are required to complete an internship at a real estate related company for a minimum of 150 hours (10 hours per week, 15-week semester). This capstone course will include bi-weekly seminars given by the Real Estate Center's Executive Director. Must be completing the Real Estate Certificate program. Contact the RE Center for registration information.

**REAL 4820-3. Topics in Real Estate.** Experimental course offered irregularly for purpose of presenting new subject matter in real estate. Prereq., REAL 3000.

**REAL 4825-3. Experimental Seminar.** Offered irregularly to provide opportunity for investigation of new frontiers in Real Estate. Restricted to juniors/seniors.

**REAL 4900 (1-3). Independent Study.** Intended for exceptionally well-qualified business seniors who desire to study an advanced topic. Must be in Real Estate Certificate Program. Prereq., dean and instructor consent.

**REAL 6820 (3-6). Graduate Seminar.** Experimental seminar offered irregularly to provide opportunity for investigation of new frontiers in real estate.

**REAL 6900 (1-3). Independent Study.** Students must have consent of instructor under whose direction study is taken. Departmental form required.

## Tourism Management

**TOMG 3060-3. Resort Tourism.** Examines principles and procedures of resort management, applications of management theory to the resort industry, and environmental issues of resort development. Prereq., 52 hours completed.

**TOMG 3400-3. Tourism Management.** Examines the basic concepts, tools, and techniques of tourism management. Examines the primary trends and issues of tourism management and the unique problems and applications of management practice in the tourism industry. Prereq., 52 hours completed.

**TOMG 3500-3. Tourism Destination Development.** Examines the economic, social, and environmental impacts of tourism development and the planning and policy implications of those impacts. Emphasizes the tourism development process and concerns in rural communities and natural environments. Prereq., 52 hours completed.

**TOMG 4820-3. Special Topics in Tourism Management.** Prereq., instructor consent.

**TOMG 4900 (1-6). Independent Study.** Prereq., both dean and instructor consent.

# School of Education

## General Education

**EDUC 2020-1. Step 1: Inquiry Approaches to Teaching.** Invites science and mathematics students to explore teaching as a career by providing first-hand experiences teaching science/math lessons in local elementary classrooms. Introduces theory and practice necessary to design and deliver excellent instruction. Master teachers provide ongoing support and feedback. Meets weekly on CU campus (1.5 hours/week) and involves additional visits to local elementary school.

**EDUC 2030-1. Step 2: Inquiry-Based Lesson Design.** Builds on EDUC 2020 and further develops lesson design and inquiry-based teaching practice. Offers opportunity to explore teaching career and learn about middle school culture. Master teacher provides support as students design and deliver lessons in middle school classrooms. Emphasizes assessment of student learning. Meets weekly on CU campus (1.5 hours/week) and involves additional visits to local middle school. Prereq., EDUC 2020.

**EDUC 2040-2. Step 1 and 2 Combination.** Designed for 2nd semester juniors/seniors/post-BAs, this course combines critical features of EDUC 2020 and 2030. Introduces theory and practice necessary to design and deliver inquiry-based instruction. Master teachers provide ongoing support and feedback. Emphasizes assessment of student learning. Meets weekly on CU campus (2.5 hours/week) and involves additional visits to local elementary/middle schools.

**EDUC 2910 (1-3). Field Practicum 1.** Offers supervised campus and off-campus experiences tied to course work in the Chancellor's Leadership RAP or the INVST program. See also EDUC 2920. May be repeated up to 6 total credit hours. Same as LDSP 2910.

**EDUC 2920 (1-3). Field Practicum 2.** Offers supervised campus and off-campus experiences tied to course work in the Chancellor's Leadership RAP or the INVST program. See also EDUC 2910. May be repeated up to 6 total credit hours. Same as LDSP 2920.

**EDUC 3013 (3-4). School and Society.** Introduces the real world of schools, teaching, and learning. Examines issues of diversity and equity from different disciplinary lenses, including history, philosophy, sociology, and anthropology. Prereq., 30 credit hours completed or in progress. Approved for arts and sciences core curriculum: human diversity.

**EDUC 4161 (1-3). Children's Literature.** Addresses reading and evaluation of books, children's, interests, authors and illustrators, folk literature, multicultural literature, modern fanciful tales, and trends.

**EDUC 4222-3. Language Study for Educators.** Provides an introduction to applied linguistics and considers various approaches to integrating attention to language study into secondary-school curricula. Addresses sociolinguistic perspectives on the nature of language development, socio-political issues pertaining to linguistic diversity in the United States, and processes of language change. Same as EDUC 5222.

**EDUC 4240-3. African American and Latino Education in the United States.** Explores the development of schooling for African Americans in the U.S. and for Latinos in the American Southwest. Emphasizes on parallels and points of intersection these historically disenfranchised groups experienced in their quest to gain access to meaningful educational opportunities. Examines how social, economic, political, and judicial action defined and organized policy and practice for these two groups. Same as EDUC 6240.

**EDUC 4411-3. Educational Psychology for Elementary Schools.** Integrates theories and ideas from elementary school child development and educational psychology. Explores theories of learning and child development and considers implications for teaching motivation, and academic achievement.

**EDUC 4580-3. Physics and Everyday Thinking.** Engages non-physics majors in hands-on, minds-on activities and labs to investigate the physical world, the nature of science, and how science knowledge is constructed. This introductory course is especially relevant for future elementary and middle school teachers although it will meet the needs of most non-physics and non-science majors. Physics content focuses on interactions and energy. Additional assignments completed at 5000-level. Same as EDUC 5580.

**EDUC 4610 (1-3). Math and Science Education.** Introduces learning theory and teaching practices for mathematics and science learning assistants. Presents theoretical issues such as conceptual development, questioning techniques, cooperative learning, nature of math/science, and argumentation in mathematics and science. Restricted to students admitted to the Learning Assistant program.

**EDUC 4716-3. Basic Statistical Methods.** Introduces descriptive statistics including graphic presentation of data, measures of central tendency and variability, correlation and prediction, and basic inferential statistics, including the t-test. Same as EDUC 5716.

**EDUC 4800 (1-9). Special Topics.** Designed to meet needs of students with topics of pertinent interest. May be repeated up to 18 total hours.

**EDUC 4810 (1-9). Special Topics.** May be repeated up to 18 total credit hours, provided the topics vary.

**EDUC 4831-3. Advanced Peer Education.** Second semester of an academic year's training for students interested in peer counseling. Expand upon what you learned in ARSC 2274. Focus on presentations, leadership, and group facilitation. Basic group leadership, facilitation theory, and technique taught. Co-create and co-lead your own small groups/presentations for other CU students. Offered only spring semesters. Prereq., ARSC 2274 or instructor consent.

**EDUC 4840 (1-4). Independent Study.**

**EDUC 4910-3. Peer Counseling Practicum (previously EDUC 4830, 4840).** Controlled enrollment. Repeatable for degree credit. Credit given for peer counseling activities. Students are selected to participate in this class and act as peer counselors or TAs for the peer counseling training.

## General Teacher Education

**EDUC 4513 (1-3). Education and Practice.** Meets during student teaching assignment. Includes topics of concern to teachers, such as classroom organization and management, lesson planning, assessment, journals, preparation of the teacher work sample, etc. Coreq., EDUC 4691, 4712, or 4722.

**EDUC 4691-10. Student Teaching: Elementary School 1.** Kindergarten through sixth grades. Prereq., completion of all education and content-specific arts and sciences requirements, and passing required licensure exam. Coreq., EDUC 4513.

**EDUC 4701 (4-8). Student Teaching: Elementary School 2.** Kindergarten and grades one through six in music. Should be taken concurrently with student teaching in home department.

**EDUC 4712-10. Student Teaching: Secondary School.** Student teacher apprentices in a middle/junior or senior high school. Must be admitted to a secondary teacher education program in English, Japanese, Latin, math, Russian, science, or social studies. Prereqs., completed all education and content-specific arts and sciences courses, and passed required licensure exam. Coreq., EDUC 4513.

**EDUC 4722-5. Student Teaching: Secondary School 2.** Student teacher attends a middle/junior high or senior high school. Must be admitted to a secondary teacher education program in French, German, Italian, or Spanish. Prereqs., completed all education and content-specific arts and sciences courses, and passed required licensure exam. Coreq., EDUC 4513.

**EDUC 4732 (4-12). Student Teaching K-12.** Required experience for music students seeking education at both elementary and secondary levels. Prereq., completed all education and content-specific music courses, passed required licensure exam. Coreq., MUSC 4193.

**EDUC 4912-1. Practicum in Teacher Education.** Provides in-school practicum experience.

## Elementary Education

**EDUC 3621 (1-3). Art for the Elementary Teacher.** Introduces elementary education students to art education. Introduces many visual art techniques, art media, and processes used in art education. The class includes hands-on studio art experiences in a format that supports subjects such as literature, writing, music, and social studies. Emphasizes the role of art education and materials

in supporting the artistic development and visual literacy of children. Prereq., completion of 30 hours of coursework. Restricted to Education majors.

**EDUC 4311-3. Children's Literature and Literary Engagement in Elementary Schools.** Prepares teacher education candidates for teaching children's literature in elementary schools. Participants will understand theoretical and developmental processes associated with literary learning, methods for teaching literature in a diverse society, and the integration of classroom instruction with the Colorado P12 Academic Standards that foster such processes. Restricted to students admitted to the elementary education program.

**EDUC 4321 (4-5). Integrated Reading and Writing for Elementary Schools.** Participants will understand theoretical and developmental processes associated with reading and writing, methods for teaching elementary reading and writing in a diverse society, and the integration of classroom instruction with the Colorado P12 Academic Standards that foster such processes. Restricted to students admitted to the elementary teacher education program.

**EDUC 4331-3. Elementary Social Studies Methods.** Prepares teacher education candidates for teaching social studies in a social context. Participants will understand theoretical and developmental processes associated with social studies learning, methods for teaching social studies in a diverse society, and the integration of classroom instruction with the Colorado P12 Academic Standards. Restricted to students admitted to the elementary teacher education program.

**EDUC 4341-3. Elementary Reading Assessment and Instruction.** Builds on knowledge and teaching practices introduced in EDUC 4321. Addresses five critical components of reading. Refines understanding of research-based practices for diagnostic assessments and intensive intervention teaching strategies for elementary age learners. Prepares candidates to deliver a comprehensive reading curriculum in the elementary grades. Prereq., EDUC 4321. Restricted to students admitted to the elementary teacher education program.

**EDUC 4351 (3-5). Differentiating Instruction in Diverse Elementary Classrooms.** Emphasizes schools and teaching and learning. Focuses on teaching culturally and linguistically diverse elementary school students, special education students, and differentiation. Includes hands-on experiences in elementary school settings. Prereq., admission to the elementary teacher education program. Coreqs., EDUC 5205 and 5215. Credit not granted for this course and EDUC 4023.

**EDUC 5205-3. Elementary Mathematics Theory and Methods.** Provides pre-service teachers opportunities to explore contemporary theories of learning, curriculum development, and pedagogical strategies pertaining to teaching elementary-level mathematics. Blends exploration in mathematical content with understanding of mathematics teaching strategies. Coreqs., EDUC 4351 and 5215. Restricted to elementary teacher education students.

**EDUC 5215-3. Elementary Science Theory and Methods.** Provides pre-service elementary teachers opportunities to explore contemporary theories of learning, curriculum development, pedagogical strategies, and assessment. Blends scientific content, pedagogy, and practical applications. Coreqs., EDUC 4351 and 5205. Restricted to students admitted to the elementary teacher education program.

## Secondary Education

**EDUC 4023 (3-5). Differentiating Instruction in Diverse Secondary Classrooms.** Emphasizes schools and teaching and learning. Focuses on teaching culturally and linguistically diverse secondary school students, special education students, and differentiation. Includes hands-on experiences in secondary school settings. Prereq., admission to the secondary or K–12 music teacher education program. Credit not granted for this course and EDUC 4351. Formerly EDUC 3023.

**EDUC 4050-3. Knowing and Learning in Mathematics and Science.** Explores essential questions relevant to teaching and learning mathematics and science. This course expands the student's understanding of current theories of learning and conceptual development. Students examine their own assumptions about learning. They critically examine the needs of a diverse student population in the classroom.

**EDUC 4060-3. Classroom Interactions.** Explores how to use curriculum and technology to build interrelationships among teachers and students. Students design and implement instructional activities informed by what it means to know and learn mathematics and science, and then evaluate the outcomes of those activities on the basis of classroom artifacts. Students examine how content and pedagogy combine to make effective teaching. Same as EDUC 5060.

**EDUC 4112-3. Educational Psychology and Adolescent Development.** Analyzes fundamental psychological concepts underlying classroom instruction, as well as adolescent growth and development. Prereq., completion of 30 hours of course work. Same as PSYC 4114.

**EDUC 4122 (2-3). Principles and Methods of Secondary Education.** For middle/junior high through senior high school levels. Presents and discusses issues in secondary school curriculum, instruction, and classroom management. Examines, analyzes, and evaluates a variety of teaching strategies, their effectiveness for students, and teacher dispositions to facilitate learning. Includes in-school experience. Restricted to students admitted to the secondary teacher education program.

**EDUC 4232-3. Language and Literacy across the Curriculum.** Explores the relationship between language and learning with the goal of developing teaching practices that engage students in using language as a tool for understanding and constructing meaning across the curriculum. Explores how language/literacy take on different forms and functions in different social contexts and academic disciplines. Restricted to students admitted to the secondary teacher education program. Same as EDUC 5235.

**EDUC 4342-3. Composition for Teachers.** Prepares beginning teachers to teach composition in the public schools according to the Colorado P12 Academic Standards. Cultivates a repertoire of skills, assessment techniques, and perspectives to successfully engage secondary students, then move them into writing proficiency. Develops proficient knowledge of strategies, planning practices, and assessment techniques to ensure student learning in a standards-based curriculum. Restricted to students admitted to the secondary English teacher education program. Same as EDUC 5345.

## Graduate Education

**EDUC 5005-3. Advanced Social Foundations of Education.** Critically examines the intellectual and political forces that shape the aims, policies, and practices of K–12 education in the United States, emphasizing the period following the *Brown v. The Board of Education* decision in 1954. Restricted to students admitted to the secondary MA+ program.

**EDUC 5035-3. Proseminar: Parent and Community Involvement.** Focuses on models and strategies for improving parent and community involvement in the schools. Discusses administrative concerns, such as parent advisory councils, and instructional concerns, such as helping children with school assignments.

**EDUC 5060-3. Classroom Interactions.** Same as EDUC 4060.

**EDUC 5065-3. Curriculum Theories.** Examines four central curricular traditions: progressive; conservative; radical; and spiritual. Highlights the strengths and weaknesses of various writers within each tradition with attention paid to the conceptual features and the practical implications of each educational view. Encourages students to examine their own educational assumptions.

**EDUC 5070-3. Spirituality and Religion in Education.** Examines features of religion, spirituality, and a liberal arts education, so as to further understand the constitutional, historical and cultural constraints on, and acceptable approaches to the study of religion and spirituality in American education. Specifically explores aspects of a contemplative orientation and the degree to which such an orientation should/can be pursued in K–12 public and higher education.

**EDUC 5075-3. Sociology in Education.** In-depth analysis of theories and concepts in sociology and education. Evolution of curriculum, organization, and enrollment characteristics of American schools. Schooling, class, culture, gender, stratification, and educational reform in light of paradigmatic change in theories and concepts of sociology.

**EDUC 5085-3. History of American Education.** Highlights social and intellectual history perspectives of American educational history, major reform movements from the 19th century to Dewey, and assessment of how differences of race, class, ethnicity, religion, power, and gender affected American education.

**EDUC 5095-3. Teachers as Researchers.** Examines questions central to K–12 curriculum and instruction. Focuses on developing research projects applicable to current classroom practice, writing proposals for curriculum investigations, conducting specific curriculum investigations, and writing research findings.

**EDUC 5105-3. Teaching for Understanding and Equity.** Introduces the knowledge base on effective teaching practices, and the theories and research that support these practices. Explores the impact of theory and research on classroom instruction. Emphasizes generic and subject-specific practices that foster conceptual understanding.

**EDUC 5115-3. Issues in School Change and Reform.** Examines recent developments in teaching, and trends in the philosophy and practice of education. Focuses special attention on a variety of issues central to school reform.

**EDUC 5165-3. Children’s Literature.** Involves reading and evaluation of picture books, and emphasizes children’s interests, authors and illustrators, multicultural literature, the components of narrative, and the features of illustrations. Examines connections between children’s literature and children’s development as writers.

**EDUC 5175-3. Elementary Mathematics Curriculum.** Provides an in-depth study of curriculum building in mathematics at the elementary school level (K–8). Gives particular attention to selection of materials, establishment of content, and evaluation of programs with respect to current reform and student-based movements in math education. Meets with EDUC 5395.

**EDUC 5185-3. Elementary Social Studies Theory and Methods.** Explores curricular and pedagogical approaches to social studies. Centers on revisionist historian content, instructional activities, integration of technology into the social studies, and the use of children’s literature, participant accounts, and historical accounts sources. Restricted to Elementary MA+ students, or MA students with instructor consent.

**EDUC 5222-3. Language Study for Educators.** Same as EDUC 4222.

**EDUC 5235-3. Language and Literacy Across the Curriculum.** Same as EDUC 4232.

**EDUC 5245-3. Foundations of Reading Instruction K–12.** Comparatively analyzes current and emerging philosophies and programs in K–12 with focus on teaching reading and thinking skills.

**EDUC 5255-3. Processes Involved in Literary Interpretation.** Stresses curiosity, observation, challenge, and insight into how children and adolescents learn to become literate beings. Discusses the work and play of literary interpretation including analytic reading, substantive discussion, reflective writing, visual presentation, and dramatic enactment where readers learn to take the words from the page to inform and transform their worlds. Prereq., EDUC 5245.

**EDUC 5265-3. Processes in Writing.** Examines processes writers use from early ages to maturity by investigating current research and proposing and evaluating research designs. Discusses the reciprocal relationship between reading and writing instruction, emphasizing the Colorado P12 Academic Standards and the International Reading Association Specialized Reading Professional Standards.

**EDUC 5275-3. Assessment in Literacy.** Assumes an interactive model of reading and supports the perspective of assessment as interrelated with curriculum and instruction; examines principles that guide the selection and interpretation of assessment techniques, with a particular focus on low-performing students. Prereq., EDUC 5255.

**EDUC 5285-3. Reading Clinic Procedures K–12.** Focuses learning on a select group of low performing students to assess reading proficiency, develop appropriate instructional goals, and provide instruction that addresses these goals. Emphasis on interpreting assessment data, extending a repertoire of instructional strategies, and developing and implementing a strong instructional plan. Prereq., EDUC 5275.

**EDUC 5305 (3-4). Proseminar: Teaching and Learning.** Presents and discusses issues in secondary school curriculum, instruction, and classroom management. Examines, analyzes, and evaluates a variety of teaching strategies, their effectiveness for students, and teacher dispositions to facilitate learning. Restricted to students admitted to the secondary MA+ program.

**EDUC 5315-3. The Nature of Science and Science Education.** Explores contemporary ideas and issues in the history, philosophy, and sociology of science education and science, science as a social and cultural activity, and how contemporary issues in science relate to and impact educational practice.

**EDUC 5316-3. Nature of Social Studies and Social Studies Education.** Prepares teacher education candidates for teaching social studies in a social context. Participants will understand theoretical and developmental processes associated with social studies learning, methods for teaching social studies in a diverse society, and the integration of classroom instruction with the Colorado P12 Academic Standards that foster such processes.

**EDUC 5317-3. Nature of Mathematics and Mathematics Education.** Explores the historical development of mathematics as a human construct, and the relationship between the discipline and the contemporary school mathematics curriculum. Focuses on the sociology of mathematics education and how cultural traditions and societal needs influence the school mathematics curriculum and educational practice.

**EDUC 5325-3. Teaching Literature in Middle and Secondary Schools.** Provides teachers of English with background and experiences relevant to using reading, writing, and a range of other classroom social languages to teach literature to a culturally and intellectually diverse population of students. Explores relevant literary theories, texts, and genres, and examines contemporary and historical perspectives on the meaning and function of stories in both personal and democratic public life. Restricted to students admitted to the secondary English education program.

**EDUC 5345-3. Composition for Teachers.** Same as EDUC 4342.

**EDUC 5355 (3-4). Methods and Materials in Secondary Social Studies.** Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching the social studies in middle and high schools. Examines the Colorado P12 Academic Standards. Prereq., EDUC 4122. Restricted to students admitted to the secondary social studies teacher education program.

**EDUC 5365 (3-4). Methods and Materials in Secondary English.** Focuses on curriculum, materials, methods, and assessment. Introduces best practices in the teaching of English in middle and high schools. Examines the Colorado P12 Academic Standards. Prereq., EDUC 4122. Restricted to students admitted to the secondary English teacher education program.

**EDUC 5375 (3-4). Project-Based Math Instruction.** Focuses on curriculum, materials, methods and assessment, and related aspects of instruction. Introduces best practices in teaching mathematics in middle and high schools. Examines the Colorado P12 Academic Standards. Restricted to students admitted to the secondary math teacher education program.

**EDUC 5385 (3-4). Project-Based Science Instruction.** Focuses on curriculum, materials, methods, assessment, and related aspects of instruction. Introduces best practices in teaching science in middle and high schools. Examines the Colorado P12 Academic Standards. Restricted to students admitted to the secondary science teacher education program.

**EDUC 5395-3. Curriculum in Secondary Mathematics.** Investigates curriculum projects in secondary school mathematics including history, modern innovations, program development, research and evaluation.

**EDUC 5425-3. Introduction to Bilingual/Multicultural Education.** Provides a comprehensive survey of bilingual-multicultural education programs for language minority students. Includes an overview of the history and legislation related to bilingual education and English as a second language. Presents various models, philosophies, and theoretical underpinnings of bilingual education and ESL.

**EDUC 5435-3. Materials and Methods in Bilingual/ Multicultural Education.** Provides an in-depth study of the curriculum options available for bilingual and ESL programs. Presents, reviews, and critiques specific methods and strategies for teaching language to minority students. Gives the opportunity

to develop and present teaching units in Spanish or in ESL methodology, as appropriate. Prereq., EDUC 5425.

**EDUC 5445-3. Curriculum for Multicultural Education.** Analyzes curriculum programs and applies principles and innovation for education of diverse students at all school levels. Includes topics of ethnic, racial, socio-economic, linguistic, and gender diversity.

**EDUC 5455-3. Literacy for Linguistically Different Learners.** Presents current and emerging philosophies and methods on teaching reading to culturally diverse second-language learners. Includes review of materials, strategies for teaching reading and writing skills, and important considerations for transference from L1 to L2 reading. Prereq., EDUC 5425 or reading course at 5000 level.

**EDUC 5460-3. Teaching and Learning Physics.** Learn how people understand key concepts in physics. Through examination of physics content, pedagogy and problems, through teaching, and through research in physics education, students will explore the meaning and means of teaching physics. Students will gain a deeper understanding of how education research is done and how people learn. Useful for all students, especially for those interested in physics, teaching, and education research. Prereq., PHYS 3210 and 3310 or instructor consent. Same as PHYS 5460.

**EDUC 5465-3. Introduction to ESL/Bilingual and Special Education.** Provides students with the fundamental information of ESL, bilingual and special education, including theories, assumptions, philosophies, and paradigms of bilingual and special education. Discusses successful teaching techniques and instructional approaches, including individualization, least restrictive environment, transition, and career education.

**EDUC 5485-3. Teaching Exceptional Children in the Regular Classroom.** Emphasizes physiological and psychological characteristics of students with disabilities as well as strategies for differentiating instruction.

**EDUC 5505-3. Education of Students with Learning and Behavior Disorders.** Discusses unique learning needs of students with learning and behavior disorders. Emphasizes development of a systems model for diagnosis, programming, and remediation. Stresses data-based individualization of instruction, with emphasis on intervention in inclusive learning environments and developing a culturally responsive system.

**EDUC 5515-3. Curriculum and Assessment for Special Learners.** Emphasizes assessment of special education students from pre-referral through staffing and placement, including response to intervention, research-based assessment practices, analytic teaching and assessment, curriculum-based assessment and measurement. Selection, administration, and interpretation of formal and informal assessment devices are studied, with particular emphasis on cultural relevance and equity in assessment for special learners with mild to severe needs.

**EDUC 5525-3. Research Issues in Special Education.** Provides practical experience in the review, critique, conceptualization, and writing of research studies in special education. Also offers experience in design of evaluation systems for classroom practice.

**EDUC 5535-3. Diagnostic Testing in ESL and Bilingual Education.** Includes both theoretical and applied aspects of diagnostic testing. Reviews administration and interpretation of current formal and informal educational tests (language proficiency). Emphasizes practices for equitable testing and assessment of English language learners.

**EDUC 5545-3. Strategies for Teaching Students with Special Needs.** Provides teachers with specific evidence-based methods and techniques for teaching students with a wide variety of high and low disabilities including learning and language disabilities, hearing and visual impairments, physical disabilities, and health impairments. Emphasizes different teaching methods, instructional materials, and learning strategies that have proven effective working students with cognitive learning needs.

**EDUC 5555 (1-4). Practicum in Bilingual/Special Education.** Offers supervised field experience in elementary and secondary special education class settings. Each credit hour requires 50 contact hours. Prereqs., EDUC 5465, 5505, and EDUC 5515 or 5545.

**EDUC 5565 (1-4). Practicum in Special Education K-12,, Leadership and Supervision.** Provides participants opportunities to use a variety of evidence- and research-based leadership and supervisory strategies acquired through

the program including leadership in such areas as assessment, collaboration, professional development, second language acquisition, special education eligibility and placement, and coaching and mentoring. Experiences include both elementary and secondary settings. Prereqs., EDUC 5465, 5505, and EDUC 5515 or 5545.

**EDUC 5575 (1-4). Workshop in Instruction and Curriculum in Content Areas.**

**EDUC 5580-3. Physics and Everyday Thinking.** Same as EDUC 4580.

**EDUC 5595 (1-4). Practicum in Linguistically Different: English as a Second Language.** University supervised, school-based field experience teaching linguistically different students, as well as assistance in the completion of EECED portfolio. Prereqs., EDUC 5425, 5435 and 5535.

**EDUC 5605-3. Research Issues in Bilingual Education.** Offers practical experience in the review, critique, conceptualization, and writing of research studies in bilingual/ESL education. Provides experience in the design of classroom evaluation systems. Prereq., EDUC 5425.

**EDUC 5615-3. Second Language Acquisition.** Presents a broad survey of second-language acquisition research. Stresses theoretical concerns and research findings and practical applications to teaching second languages. Gives special emphasis to second-language acquisition.

**EDUC 5625-3. Methods of Teaching English as a Second Language.** Prepares teachers to teach English as a second language in public schools in the United States. Covers both theoretical and applied aspects of language learning and teaching. Recommended prereq., EDUC 5615.

**EDUC 5635-3. Education and Sociolinguistics.** Explores the discipline of sociolinguistics, the study of language variation and use, and its application within education settings. Not designed as an advanced sociology or linguistics course. Areas of study include language variation, speech communities, the ethnography of communication, speech and social identities, and sociolinguistic research related to teaching and learning.

**EDUC 5705-3. Theories of Learning and Development.** Examines current theory and research on child development, learning, and motivation. Emphasizes the relationship between and among development, learning, motivation, and how theory and research can inform instructional decisions in the elementary classroom. Restricted to students admitted to the elementary MA+ program. Coreq., EDUC 5715.

**EDUC 5706-3. Assessment in Mathematics and Science Education.** Examines purposes and practices of assessment in mathematics and science education. Particular attention is given to application of theoretical foundations and contemporary research in the design and use of assessment techniques and tools to support teaching for student understanding. Addresses the role of effective formative assessment in teaching and learning.

**EDUC 5715-4. Education, Society, and the Elementary Teacher.** Introduces issues affecting teachers and the teaching profession. Examines the most pressing (i.e., controversial) issues in American education. It also examines and analyzes the cultural, structural, and institutional features of schooling. Restricted to students admitted to the elementary MA+ program. Coreq., EDUC 5705.

**EDUC 5716-3. Basic Statistical Methods.** Same as EDUC 4716.

**EDUC 5725-4. Issues in Elementary Education.** Introduces the role of practical reasoning in curricular and pedagogical practice. Students examine and analyze current curriculum material, pedagogical practices, and instructional contexts. Restricted to elementary MA+ students.

**EDUC 5726-3. Introduction to Disciplined Inquiry.** Considers various research approaches and methodologies included in education including experimental and quasi-experimental methods; anthropological and case study methods; evaluative research and field studies; correlational; and sociological, historical, and philosophical research. Topics include library research, research criticism, and proposal writing.

**EDUC 5810-3. Teaching K-12 Mathematics: Number Sense.** Provides teachers opportunity to explore fundamental mathematical theories and pedagogical perspectives pertaining to the teaching and learning of number and operation. Engages students in explorations of mathematical content underlying number and operations, while highlighting relevant problem solving, reasoning and proof, and mathematical connections. Explores implications of teach-

ers' mathematical learning on their classroom teaching. Develops practices supporting learner's number sense development.

**EDUC 5820-3. Teaching K–12 Mathematics: Algebraic Thinking.** Uses reform-based mathematics curricula to engage participants in algebraic thinking, to reflect on their own knowledge of algebraic concepts, and to examine pedagogical ideas that can foster K–12 students' algebraic thinking and learning. Algebraic topics include patterning, variable, functions, multiple representations, equality, and solving linear and systems of equations.

**EDUC 5830-3. Teaching K–12 Mathematics: Geometry & Measurement.**

Provides an opportunity to explore how to foster geometric thinking while examining fundamental mathematical theory underlying the content area of geometry and measurement. Emphasizes investigative approach involving problem solving, reasoning, connections, and communication as well as learning mathematics content in a flexible and conceptual way. Challenges participants to apply their understanding to teaching practices that foster geometric thinking in K–12 learners.

**EDUC 5840-3. Teaching K–12 Mathematics: Probability & Statistics.** Focuses on teaching probability, data analysis, and statistics in K–12 classrooms. Explores curriculum and assessment strategies in the areas of probability and statistics. Examines research on students' thinking on stochastic tasks and how this research informs teaching practice. Emphasizes deepening of one's conceptual understanding of probability and statistics and their importance in the current information age.

**EDUC 6210-3. Education Policy and the Law.** Approaches education policy issues through the rich history of litigation and current legal challenges facing American K–12 schooling. Builds an understanding of the legal and policy development of the American schooling system, particularly in the 20th century. Laws and legal cases will be used as jumping-off points for broader discussions.

**EDUC 6220-3. Gender Issues in Education.** Provides a strong foundation in the various gender issues in education. Stimulates explorations into the ways the construct of "gender" affects and is affected by the educational system and process. Presents knowledge and research about contemporary gender-related educational issues and theories of gender in education. Encourages development of well-considered views about the various issues, research, and theories.

**EDUC 6230-3. Ethics in Education.** Investigates controversies in education from a self-consciously ethical perspective, drawing as appropriate from moral and political theory as well as law. Focuses on public education's role in fostering democratic citizenship and providing equal educational opportunity. Critically evaluates various education reform policies and curriculum policies. Applies method commonly used in medical ethics to make decision regarding concrete ethically problematic cases.

**EDUC 6240-3. African American and Latino Education in the United States.** Same as EDUC 4240.

**EDUC 6318-3. Psychological Foundations of Education.** Introduces students to theoretical and empirical contributions of educational psychology, emphasizing applications to educational practices. Topics include learning, development, cognitive processes, social and cultural context, motivation, assessment, and individual differences.

**EDUC 6325-3. Culture and Ethnography in Education.** Applies anthropological perspectives to research in educational settings. Focuses on theories of culture, cultural transmission and acquisition, and cultural reproduction and production for understanding schooling and its outcomes.

**EDUC 6328-3. Advanced Child Growth and Educational Development.** Introduces students to recent theoretical and research advances in the study of children and adolescent's cognitive, social and emotional development, with an emphasis on implications for learning in and out of school.

**EDUC 6338-3. Cognitive Processes in Education.** Introduces students to recent theoretical and research advances in the study of human learning and cognitive processes, with implications for instruction and other educational practices. Prereq., EDUC 6318 or instructor consent.

**EDUC 6358-3. Children's Thinking.** Introduces students to the psychology of children's thinking. Topics include memory, concept acquisition, strategies, problem solving, and originality. Prereq., EDUC 6318.

**EDUC 6368-3. Adolescent Psychology and Development for Teachers.** Examines current theory and research on adolescent development, learning, motivation, and academic achievement. Emphasizes how theory and research can inform instructional decisions in the secondary classroom. Restricted to students admitted to the secondary MA+ program.

**EDUC 6504-3. Issues and Methods in Cognitive Science.** Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Prereq., graduate standing or at least one upper-division course in computer science, linguistics, philosophy, or psychology. Same as CSCI 6402, LING 6200, PHIL 6310, and PSYC 6200.

**EDUC 6505 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as CSCI 7762, LING 7762, and PSYC 7765.

**EDUC 6506-2. Cognitive Science Research Practicum.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereq., CSCI 7762 or EDUC 6505 or LING 7762 or PHIL 7310 or PSYC 7762. Same as PSYC 7415, LING 7415, and CSCI 7412.

**EDUC 6516-2. Cognitive Science Research Practicum 2.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506. Same as PSYC 7425, LING 7425, and CSCI 7422.

**EDUC 6804 (1-4). Special Topics.** May be repeated up to 12 total credit hours.

**EDUC 6811 (3-4). Teaching and Learning Biology.** Provides an introduction to recent research into student learning on the conceptual foundations of modern biology, together with pedagogical methods associated with effective instruction and its valuation. Students will be involved in active research into conceptual and practical issues involved in biology education, methods to discover student preconceptions, and the design, testing and evaluation of various instructional interventions. Same as MCDB 4811/5811.

**EDUC 6844 (1-4). Master's Independent Study.**

**EDUC 6855 (1-4). Independent Study in Instruction and Curriculum in Content Areas: Master's Level.**

**EDUC 6888 (1-4). Independent Study in Educational and Psychological Studies: Master's Level.**

**EDUC 6899 (1-4). Independent Study in Social, Multicultural, and Bilingual Foundations: Master's Level.** Instructor consent required.

**EDUC 6915 (1-4). Practicum in Instruction and Curriculum in Content Areas.**

**EDUC 6916 (1-4). Practicum in Research and Evaluation Methodology.**

**EDUC 6918 (1-4). Practicum in Educational and Psychological Studies.**

**EDUC 6919 (1-4). Practicum in Social, Multicultural, and Bilingual Foundations.** Prereq., instructor consent required.

**EDUC 6925 (1-4). Readings in Instruction and Curriculum in Content Areas.**

**EDUC 6926 (1-4). Readings in Research and Evaluation Methodology.**

**EDUC 6928 (1-4). Readings in Educational and Psychological Studies.**

**EDUC 6929 (1-4). Readings in Social, Multicultural, and Bilingual Foundations.** Instructor consent required.

**EDUC 6944-(1-3). Master's Degree Candidate.**

**EDUC 6954-4. Master's Thesis.**

**EDUC 6964-3. Capstone: Inquiry in the Content Areas.** Supports students in using and building on the ideas and content encountered in previous coursework. Requires students to conceptualize, design and implement an original research project in content area that will serve as exit requirement for the degree. Reads and engages in research and theory associated with Teacher Research (i.e. research conducted by teachers for professional purposes).

**EDUC 7015-3. Teaching Internship in Teacher Education.** One-semester teaching internship in an undergraduate or graduate foundations course.

**EDUC 7055-3. Philosophy of Education.** Examines exemplars of educational philosophy from ancient times to the present day, emphasizing their relevance and application to current controversies in education (e.g., multiculturalism, gender equity, and school choice). Formerly EDUC 5055.

**EDUC 7105-3. Collaboration to Meet Special Needs.** Covers effective collaboration practices involving the special education teacher, other educational personnel, students, and parents. Bilingual special education considerations in collaboration will be described. Issues regarding inclusion will be explored. Practical application to teaching and learning will be made. Strategies for disseminating information and collaborative activities will be discussed.

**EDUC 7316-3. Intermediate Statistical Methods.** Studies sampling theory and inferential statistics; advanced applications for testing of hypotheses regarding central tendency, variability, proportion, correlation, and normality; chi-square and the analysis of frequency data; multiple regression and prediction; introduction to the analysis of variance; and related computer programs for statistical analysis. Prereq., EDUC 5716. Required of all doctoral candidates.

**EDUC 7326-3. Experimental Design and Analysis 1.** Focuses on experimental and quasi-experimental designs in educational research; applications of the general linear model; power and statistical efficiency; randomization and control; multiple comparisons; factorial experiments and interaction with fixed-factor and mixed design; analysis of covariance; effects of assumption violations; and related computer programs for statistical analysis. Prereqs., EDUC 5726 and 7316.

**EDUC 7336-3. Methods of Survey Research and Assessments.** Examines theory and techniques involved in each stage of survey research, including problem formulation, questionnaire development, interview and mailed surveys, assessing reliability and validity, sampling plans, data reduction (e.g., factor analysis), and analysis of continuous and categorical data. Prereqs., EDUC 5726 and 7316.

**EDUC 7346-3. Ethnographic Methods in Educational Research.** Explores the history of ethnography and its translation into educational research. Students practice participant observation, interviewing, journal writing, artifact searches, qualitative analysis and interpretation, and styles of reporting. Prereq., EDUC 6325 or equivalent doctoral level course in anthropological or sociological theory, or sociology of education.

**EDUC 7376-3. Theory and Practice of Educational and Psychological Measurement.** Introduces theories of measurement and applications, and presents classical test theory. Includes quantitative concepts, methods, and computational techniques for the development, application, and evaluation of measurement instruments in social/ behavioral science and education. Prereq., EDUC 5716.

**EDUC 7386-3. Educational Evaluation.** Builds an understanding of the range of approaches taken by educational evaluators, focusing particularly on the evaluation of programs. Explores the nature of different evaluation perspectives and how these disparate views translate into methodological and conceptual models. Students develop a familiarity with the most common and influential approaches to evaluation.

**EDUC 7396-3. Multivariate Analysis.** Introduces contemporary advanced multivariate techniques and their application in social science research. Methods include multivariate regression and analysis of variance, structural equation models, and hierarchical/multi-level models. Prior experience with ANOVA and multiple regression is assumed.

**EDUC 7416-3. Seminar: Research Methodology.** Presents selected topics for advanced study in educational research, statistics, measurement, and evaluation.

**EDUC 7436-3. Item Response Theory.** Includes one-, two-, and three-parameter logistic models for dichotomously-scored items and partial credit models

for polychotomously-scored items; applications of the models to problems such as equating of test forms, test design, computerized adaptive testing, and the detection of item bias. Prereqs., EDUC 7316, 7376.

**EDUC 7446-3. Seminar: Policy Issues in Education.** Explores major policy issues confronting U.S. education and examines the nature and undertaking of educational policy studies. Learn to approach policy issues from a contextual perspective that highlights systemic forces and analyzes and applies differing policy instruments. While a wide variety of policies are covered in the course, it particularly emphasizes issues of educational equity.

**EDUC 7456-3. Advanced Multivariate Methods: Multi-level and Latent Variable Modeling.** Covers in depth two advanced multivariate models common to social science research: latent variable (structural equation) models and multi-level (hierarchical) models. Topics may be taught with a particular analytic context, such as measurement of change (longitudinal analysis) or experimental design. Prereq., EDUC 7396 or equivalent.

**EDUC 7775 (1-2). Topics in Cognitive Science.** Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in ICS Cognitive Science Academic Programs. Same as LING 7775, CSCI 7772, PSYC 7775 and SLHS 7775.

**EDUC 8014-3. Doctoral Seminar: Multiculturalism and Education.** Addresses the sociopolitical context of multiculturalism and education, and the sociocultural context of learning. Examines critical issues involved in making schooling responsive to an increasingly multicultural and multilingual society. Required for all doctoral students. Prereqs., EDUC 8210, 8220, 8230 8240, 8250 and 8260.

**EDUC 8025-3. Seminar: Curriculum Theories.** Examines in depth recent developments in curriculum theory highlighting conceptual, contextual, and normative issues. Substantially explores distinct curricular traditions, corresponding conceptions of the good life along with related approaches to reason and emotion. Focuses on the works of prominent curriculum theorists.

**EDUC 8045-3. Philosophical Issues in Educational Research.** Familiarizes students with important concepts and issues from the philosophy of science and, to a lesser extent, political theory and ethics; grounds such concepts and issues in the literature (often in terms of primary philosophical sources); and stimulates students to apply this material to the field of educational research in an informed way.

**EDUC 8055-3. Theoretical Issues in Education Policy.** Provides students with an examination of the theories behind education policy analysis. Takes a thematic approach to the study of policy in order to understand how policy agendas are set; how democratic deliberation should be linked with research and policy; and the relationship between politics, social structures, research, and policies.

**EDUC 8125-3. Seminar: Radical Education Theories.** Examines radical analyses, based on class, gender, and race, that public schooling in the U.S. maintains a dynamic of oppression and domination that undermines the schools' democratic premise. Scrutinizes the conceptual framework, interpretive and explanatory adequacy, and ethical justification of radical claims.

**EDUC 8135-3. Seminar: Research on Teaching.** Provides an historical perspective of research on teaching, focusing on the evolution of conceptual frameworks, research methods, and research findings. Examines substantive and methodological issues that underlie contemporary research on teaching. Explores areas of research including teacher knowledge and beliefs, teaching for understanding, understanding student thinking, motivation and volition, and classroom assessment.

**EDUC 8145-3. Seminar: Research on Teacher Education and Learning to Teach.** Explores substantive and methodological issues that underlie current research on learning to teach, teacher education, and teacher professional development. Considers the learning and development of experienced and novice teachers, with an emphasis on learning to teach in ways that conform to reform-based educational ideas.

**EDUC 8155-3. Advanced Topics in Literacy Education.** Examines special topics in theory and research related to literacy and literacy education. Topics vary each semester. May be repeated up to 12 total credit hours.

**EDUC 8165-3. Advanced Topics in Mathematics Education.** Examines special topics in theory and research related to mathematics education. Topics vary each semester. May be repeated up to 12 total credit hours.

**EDUC 8175-3. Advanced Topics in Science Education.** Examines special topics in theory, research, and assessment related to science education. Focuses on the development of the doctoral prospectus. Provides opportunities for students to defend their own work and to critique the work of their peers. Topics range from theoretical framing to presenting and defending one's work. May be repeated up to 12 total credit hours.

**EDUC 8210-3. Perspectives on Classroom Teaching and Learning.** Introduces students to various paradigms within educational research and how they are employed to study teaching and learning in K–12 classrooms. Includes an analysis of the theories, assumptions, questions, methods, and findings associated with each of them. Restricted to first-year doctoral students in education.

**EDUC 8220-3. Introduction to Educational Research and Policy.** Introduces conceptual and empirical issues and controversies in educational research and policy. Complements other doctoral courses in quantitative and qualitative methodology. Restricted to first-year doctoral students in education.

**EDUC 8230 (3-4). Quantitative Methods I.** Explores the use of statistics to formalize research design in educational research. Introduces descriptive statistics, linear regression, probability, and the basics of statistical inference. Includes instruction in the use of statistical software, (e.g., SPSS.) Restricted to first-year doctoral students in education.

**EDUC 8240 (3-4). Quantitative Methods II.** Continues the exploration of research design in the social sciences, especially the evaluation of the quantitative research reported in professional journals. Introduces instances of the general linear model (both multiple regression and ANOVA) and its application to educational research. Prereq., EDUC 8230 or equivalent. Restricted to first-year doctoral students in education.

**EDUC 8250-3. Qualitative Methods I.** Introduces students to the theory and practice of qualitative research in education. First of a two-course sequence covering research design, theoretical perspectives, and methods. Preference given to first-year doctoral students in education.

**EDUC 8260-3. Qualitative Methods II.** Builds on EDUC 8250 to develop knowledge and skills in ethnographic and case study research. Second of a two-course sequence covering qualitative research design, theoretical perspectives, and methods. Preference given to first-year doctoral students in education.

**EDUC 8348-3. Seminar: Human Development.** Intensive study of selected topics in human development. The focus of the seminar will vary depending on the instructor's expertise and students' interests; may repeat for credit more than once. Recent topics include adolescent development in social context, Vygotsky and Cultural-Historical Activity Theory, and teaching and learning in and out of school. Prereqs., EDUC 6318, EDUC 8210, or instructor consent.

**EDUC 8358-3. Seminar: Human Learning.** Intensive study of selected topics in human learning. The focus of the seminar will vary depending on the instructor's expertise and students' interest; may repeat for credit more than once. Recent topics include sociocultural, situated, and other approaches to understanding the role of discourse in learning and teaching disciplinary content in school. Prereq., EDUC 6318, EDUC 8210, or instructor consent.

**EDUC 8610-3. Advanced Topics in Educational Equity and Cultural Diversity.** Examines special topics in theory and research related to educational equity and cultural diversity in education. Topics vary each semester. May be repeated up to 12 total credit hours.

**EDUC 8710-3. Measurement in Survey Research.** Introduces students to classical test theory and item response theory. Emphasizes the process of developing, analyzing and validating a survey instrument. Focuses on developing a survey instrument with items that derive from a clearly delineated theory for the construct to be measured. Analyzes item responses and put together a validity argument to support the proposed uses of the survey.

**EDUC 8720-3. Advanced Topics in Measurement.** Focuses on psychometric models for measurement and their applications in educational and psychological research. Emphasizes understanding and evaluating the utility of models from item response theory (IRT). Applies and compares measurement models in the context of simulated or empirical data sets. Recommended prereq., EDUC 8710.

**EDUC 8730-3. Advanced Qualitative Data Analysis.** Requires students begin semester with qualitative data already collected (from class project, pilot study, dissertation). Focuses on three approaches to data analysis: reconstruction, coding (deductive and inductive), and constant comparative method. Students apply these approaches to their own data. Instructors customize part of course to address specific topic of expertise, e.g., discourse analysis, video analysis, textual analysis, ethnographic analysis. May be repeated up to 12 total credit hours.

**EDUC 8740-3. Advances in the Assessment of Student Learning.** Focuses on theories underlying traditional and contemporary proposals for assessment of student learning, and design and research of large-scale and classroom-based methods to assess student learning. Explores intersections between large-scale and classroom assessment, although gives greater attention to issues related to classroom assessment.

**EDUC 8804 (1-3). Special Topics.** Designed to meet needs of graduate students with topics of pertinent interest.

**EDUC 8844 (1-4). Doctoral Independent Study.**

**EDUC 8855 (1-4). Independent Study in Instruction and Curriculum in Content Areas: Doctoral Level.**

**EDUC 8866 (1-4). Independent Study in Research and Evaluation Methodology: Doctoral Level.**

**EDUC 8888 (1-4). Independent Study in Educational and Psychological Studies: Doctoral Level.**

**EDUC 8899 (1-4). Independent Study in Social, Multicultural, and Bilingual Foundations: Doctoral Level.** Prereq., instructor consent required.

**EDUC 8935 (1-6). Internship in Instruction and Curriculum in Content Areas.**

**EDUC 8936 (1-6). Internship in Research and Evaluation Methodology.**

**EDUC 8938 (1-6). Internship in Educational and Psychological Studies.**

**EDUC 8939 (1-6). Internship in Social, Multicultural, and Bilingual Foundations.** Prereq., instructor consent required.

**EDUC 8994 (1-10). Doctoral Dissertation.**

## Graduate Teacher Education

**GRTE 5010 (.5-5). Graduate Humanities for Teachers.** Addresses special topics in arts and humanities with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.

**GRTE 5020 (.5-5). Graduate Mathematics for Teachers.** Addresses special topics in mathematics with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.

**GRTE 5030 (.5-5). Graduate Natural Sciences for Teachers.** Addresses special topics in natural sciences with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.

**GRTE 5040 (.5-5). Graduate Social Sciences for Teachers.** Addresses special topics in social sciences with an emphasis on building conceptual understanding of content and enhancing teacher's practice in teaching this content.



# College of Engineering and Applied Science

## Aerospace Engineering Sciences

### Aerodynamics and Fluid Mechanics

**ASEN 2002-5. Aerospace 2: Introduction to Thermodynamics and Aerodynamics.** Introduces the fundamental principals and concepts of thermodynamics and fluid dynamic systems. Emphasizes the synthesis of basic science (physics), mathematics, and experimental methods that form the basis for quantitative and qualitative analyses of general aerospace technology systems. Proficiency in Matlab required. Prereqs., APPM 1360, GEEN 1300 or CSCI 1300, CHEN 1211, CHEM 1221 and PHYS 1110 (min. grade C). Coreqs., ASEN 2001 and APPM 2350. Restricted to ASEN majors. Offered fall only.

**ASEN 3111-4. Aerodynamics.** Develops the fundamental concepts of aerodynamics and provides a working knowledge for their application to the design of aircraft and launch vehicles operating at various speeds and altitudes, as well as the atmospheric forces on satellites. Prereqs., APPM 2350, ASEN 2002 and 2004 (min. grade C). Restricted to ASEN majors. Offered fall only.

**ASEN 5021-3. Viscous Flow.** Studies low Reynolds number flows, including incompressible and compressible laminar boundary layer theory; similarity theory; and separation, transition, and turbulent boundary layers. Prereq., ASEN 5051 or equivalent, or instructor consent.

**ASEN 5037-3. Turbulent Flow Analysis.** Studies turbulent closure methods and computational procedures used to solve practical turbulent flows. Emphasizes multi-equation models used with time-averaged equations to calculate free-turbulent shear-flows and turbulent boundary layers. Employs spectral methods in direct and large-eddy simulation of turbulence. Prereq., ASEN 5051 or equivalent.

**ASEN 5051-3. Fluid Mechanics.** Highlights physical properties of gases and liquids; kinematics of flow fields; and equations describing viscous, heat-conducting Newtonian fluids. Emphasizes exact solutions and rational approximations for low and high speed dissipative flows, surface and internal waves, acoustics, stability, and potential flows. Prereq., instructor consent.

**ASEN 5151-3. High Speed Aerodynamics.** Provides aerodynamic theory applicable to the high speed flight of subsonic, transonic, and supersonic aircraft, and hypersonic vehicles. Topics include linear theory of subsonic and supersonic speeds, the nonlinear theories of transonic and hypersonic speeds, and compressible boundary layers. Prereq., graduate standing or instructor consent.

**ASEN 5327-3. Computational Fluid Mechanics.** Introduction to advanced computational methods for the solution of fluid mechanics problems on the computer with emphasis on nonlinear flow phenomena. Prereq., ASEN 5417 or instructor consent.

**ASEN 6021-3. Viscous Flow.** Studies low Reynolds number flows, including incompressible and compressible laminar boundary layer theory; similarity theory; and separation, transition, and turbulent boundary layers. Prereq., ASEN 5051 or equivalent, or instructor consent.

**ASEN 6037-3. Turbulent Flows.** Studies turbulent closure methods and computational procedures used to solve practical turbulent flows. Emphasizes multi-equation models used with time-averaged equations to calculate free-turbulent shear-flows and turbulent boundary layers. Employs spectral methods in direct and large-eddy simulation of turbulence. Prereq., ASEN 5051 or equivalent.

**ASEN 6061-3. Real Gas Dynamics.** Explores physics of particles, physics of uniform fluids, kinetic description of fluids, transport phenomena. Restricted to graduate students or instructor consent.

**ASEN 6427-3. Advanced Computational Gas Dynamics.** Introduces computational techniques particularly applicable to high-speed gas flows that contain shocks. Complicated numerical methods are developed from relatively simple numerical modules. Prereq., ASEN 5417 or instructor consent.

## Aerospace Design and System Engineering

**ASEN 1000-1. Introduction to Aerospace Engineering Sciences.** Introduces aerospace history, curriculum, ethics, and the many areas of emphasis within aerospace engineering. Academic and industry speakers are invited to address various aerospace topics. Restricted to freshmen engineering students.

**ASEN 2004-5. Aerospace 4: Aerospace Vehicle Design and Performance.** Introduction to design and analysis of aircraft and spacecraft. Aircraft topics include cruise performance, wing design, propulsion, stability, control, and structures. Spacecraft topics include rocket staging, orbit selection, launch systems, and spacecraft subsystems. Includes laboratory experiments and team design exercises. Prereqs., ASEN 2001, 2002, and APPM 2350 or MATH 2400 (min. grade C). Restricted to ASEN majors. Offered spring only.

**ASEN 2500-3. Gateway to Space.** Introduces the basics of atmosphere and space sciences, space exploration, spacecraft design, rocketry, and orbits. Students design, build, and launch a miniature satellite on a high altitude balloon. Explores the current research in space through lectures from industry. Restricted to freshmen in engineering or science. Same as ASTR 2500.

**ASEN 3128-4. Aircraft Dynamics.** Develops the fundamental concepts of aircraft dynamics. Covers flight mechanics, performance, dynamics and control of aircraft, and how they impact aircraft design. Prereqs., ASEN 2002, 2003, 2004, and APPM 2360 (min. grade C). Restricted to ASEN majors. Offered spring only.

**ASEN 4018-4. Senior Projects 1: Design Synthesis.** Focuses on the synthesis of technical knowledge, project management, design process, leadership, and communications within a team environment. Students progress through the design process beginning with requirements development, then preliminary design and culminating with critical design. Prereqs., ASEN 3111, 3112, 3113, 3128, 3200 and 3300 (min. grade C). Restricted to ASEN majors. Offered fall only.

**ASEN 4028-4. Senior Projects 2: Design Practicum.** Focuses on the fabrication, integration, and verification of designs produced in ASEN 4018. Students work within the same teams from ASEN 4018. Prereq., ASEN 4018 (min. grade C) and instructor consent required. Restricted to ASEN majors. Offered spring only.

**ASEN 4138-3. Aircraft Design.** Two lectures and one lab per week. Examines principles of aircraft configuration and design to meet given performance specifications, taking into account aerodynamic, stability and control, and flying quality considerations, as well as airworthiness regulations. Includes preliminary design of the major elements of an aircraft. Prereq., ASEN 3128. Restricted to ASEN majors.

**ASEN 4148-3. Spacecraft Design.** Provides the fundamentals necessary to complete the conceptual design of an unmanned spacecraft. Topics include mission design, propulsion, power, structure, thermal, attitude control, communication, command and data handling and attitude control systems. Project management, systems engineering and related topics in space systems are reviewed. The class is designed to enhance teaming and communication skills. Restricted to senior ASEN majors or instructor consent. Same as ASEN 5148.

**ASEN 4218-3. Large Space Structures Design.** Develops the necessary structural analysis skills for conducting conceptual and preliminary designs of large space structures with a practical emphasis on structures considered by NASA over the past 20 years. Applies analysis skills to a broad range of space missions requiring large space structures, emphasizing low cost and practical design. Prereq., senior standing in ASEN or MCEN, or instructor consent. Same as ASEN 5218.

**ASEN 4238-3. Computer-Aided Control Systems Design.** Covers Matlab and Simulink software, and multivariable control system synthesis and analysis techniques for typical aerospace control problems. Students formulate control problems and synthesize control functions using lineage quadratic techniques. Includes numerical integration of differential equations and nonlinear simulation of orbit and attitude dynamics. Prereq., APPM 2360.

**ASEN 4248-3. Computer-Aided Control System Design 2.** Studies theory and engineering applications of Kalman filter techniques. Covers discrete and continuous filters, the extended Kalman filter, and their application to guidance, navigation, and control, including satellite orbit and attitude problems,

inertial and control navigation, and the Global Positioning System. Prereq., ASEN 4238 or instructor consent.

**ASEN 5034-3. Stochastic Methods for Systems Engineering.** Same as ASEN 4034.

**ASEN 5148-3. Spacecraft Design.** Same as ASEN 4148.

**ASEN 5158-3. Space Habitat Design.** Utilizes systems engineering methods for designing a spacecraft intended for human occupancy and provides a working knowledge of the technologies used to sustain life. Emphasis is placed on deriving functional requirements from stated mission objectives, developing integrated vehicle schematics, and comparing design options by trade study. Prereq., graduate standing in engineering or senior with 3.25 GPA.

**ASEN 5168-3. Remote Sensing Instrumentation Design.** Reviews and makes a detailed analysis of satellite instrumentation techniques and systems to understand the components, limitations, and overall capabilities. Emphasis on optical systems with in-depth treatment of conventional radiometry. Introduces both passive and microwave methods.

**ASEN 5188-3. Space Systems Engineering.** Develop an understanding and appreciation for the fundamentals and pragmatic principles of systems engineering and their application to space missions. This course establishes a working knowledge of the primary techniques systems engineers use to guide the development of complex systems, including: requirements development, system synthesis, good design practices, system optimization, exception handling, interface management and trade studies.

**ASEN 5218-3. Large Space Structures Design.** Same as ASEN 4218.

## Astrodynamics and Orbital Mechanics

**ASEN 3200-4. Orbital Mechanics/Attitude Dynamics and Control.** Presents the fundamentals of orbital mechanics, 3D rigid body dynamics, and satellite attitude dynamics and controls. Prereqs., ASEN 2003, 2004, and APPM 2360 (min. grade C). Restricted to ASEN majors. Offered spring only.

**ASEN 4010-3. Introduction to Space Dynamics.** Includes central force fields, satellite orbits, rocket dynamics, orbital transfer, interplanetary mission analysis, and perturbation due to atmospheric drag and Earth oblateness. Prereq., ASEN 3200 or equivalent, or instructor consent required.

**ASEN 5010-3. Spacecraft Attitude Dynamics and Control.** Includes rigid body kinematics and spacecraft attitude descriptions, torque-free attitude dynamics, static attitude determination, motion and stability due to gravity gradient torque and spinning craft, passive and active methods of attitude control, nonlinear regulator and attitude tracking feedback control laws. Prereq., ASEN 3200 or equivalent.

**ASEN 5050-3. Space Flight Dynamics.** Includes celestial mechanics, space navigation, and orbit determination; trajectory design and mission analysis trajectory requirements; and orbital transfer and rendezvous. Prereq., ASEN 3200 or instructor consent.

**ASEN 5070-3. Introduction to Statistical Orbit Determination 1.** Develops the theory of batch and sequential (Kalman) filtering, including a review of necessary concepts of probability and statistics. Course work includes a term project that allows students to apply classroom theory to an actual satellite orbit determination problem.

**ASEN 6060-3. Advanced Space Flight Dynamics.** Topics include perturbations of orbital motion; classical orbit determination from angles-only observation; modern orbit determination using range and range-rate data; orbit transfer using impulses or continuous thrust; and others. Prereq., ASEN 5050 or instructor consent.

**ASEN 6070-3. Satellite Geodesy.** Focuses on the measurement of the Earth's gravitational field, rotational characteristics, and shape using Earth and space-based tracking of artificial satellites. Particular emphasis on satellite altimetry and satellite gravity measurements. Prereq., ASEN 3200 or instructor consent. Credit not granted for this course and ASEN 5060.

**ASEN 6080-3. Introduction to Statistical Orbit Determination 2.** Continuation of ASEN 5070. Emphasizes orthogonal transformation techniques such as Givens and Householder, square root filtering and smoothing, and considers covariance analysis. Also includes coordinate systems, force models, and time and polar motion. Requires term project that involves the application

of many of the techniques required for precise orbit determination. Prereq., ASEN 5070. Formerly ASEN 5080.

## Atmospheric, Oceanic, and Space Sciences

**ASEN 4215-3. Descriptive Physical Oceanography.** Introduces descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems. Restricted to seniors and graduate students. Same as ASEN 5215 and ATOC 4215.

**ASEN 4255-3. Environmental Aerodynamics.** A review of the properties and causes of hazards posed by the environment, ranging from atmospheric wind shear to tornadic flows. Involves a multidisciplinary approach combining analytical, numerical, scale modeling studies with extensive field measurements, wind energy, and biophysical aerodynamics. Prereq., senior standing in ASEN. Same as ASEN 5255.

**ASEN 5215-3. Descriptive Physical Oceanography.** Same as ASEN 4215 and ATOC 5215.

**ASEN 5255-3. Environmental Aerodynamics.** Reviews the properties and causes of hazards posed by the environment, ranging from atmospheric wind shear to tornadic flows. Involves a multidisciplinary approach, combining analytical, numerical, and scale modeling studies with extensive field measurements, wind energy, and biophysical aerodynamics. Prereq., senior standing in aerospace engineering.

**ASEN 5315-3. Ocean Modeling.** Introduces students to basic principles behind, and the current practices in, ocean modeling. Discusses different prevailing approaches. Offers students hands-on experience with the use of supercomputers and workstations for model running and pre- and post-processing. Prereqs., graduate standing or instructor consent.

**ASEN 5325-3. Small Scale Processes in Geophysical Fluids.** Provides an overview of mixing and wave processes in the oceans and the atmosphere. Topics include turbulent boundary layers in the lower atmosphere and the upper ocean, air-sea interactions, and surface and internal waves. Prereq., graduate standing or instructor consent.

**ASEN 5335-3. Aerospace Environment.** Examines the components of the solar-terrestrial system and their interactions to provide an understanding of the re-entry and orbital environments within which aerospace vehicles operate. Includes the Sun, solar wind, magnetosphere, ionosphere, thermosphere, radiation belts, energetic particles, comparative environments (Mars, Venus, etc.), orbital debris, spacecraft charging, particle effects on systems, shielding, and satellite drag. Prereq., senior or graduate standing in engineering or related physical sciences.

## Bioastronautics and Microgravity Science

**ASEN 3116-3. Introduction to Biomedical Engineering.** Addresses human responses to environment and physical stimuli. Makes use of engineering and physical principles in the study of human dynamics, arriving at reasonable solutions to 15 major areas of biomedical consent. Prereq., instructor consent.

**ASEN 4216-3. Neural Signals and Functional Brain Imaging.** Explores bioelectric and metabolic signals generated by the nervous system from two stand points: 1) their biophysical genesis and role in neural integration and 2) neurotechnologies such as electroencephalography, magnetoencephalography, deep brain stimulation, and functional magnetic resonance imaging. Prereqs., ECEN 2260 or 3030, ASEN 3300, or instructor consent. Same as ASEN 5216 and ECEN 4811.

**ASEN 4426-3. Neural Systems and Physiological Control.** A biophysical exploration of human physiology from the standpoints of control systems and neural information processing. Topics include: neural control of movement and cardiovascular performance, tissue growth and repair, carcinogenesis, and physiological responses to microgravity. Prereqs., ECEN 2260 or 3030, ASEN 3300, or instructor consent. Same as ASEN 4426 and ECEN 4821/5821.

**ASEN 4436-3. Brains, Minds, Computers.** An introductory, integrative survey of brain science, cognitive science, artificial intelligence, and their interrela-

tions. Considers central concepts and principles from each of these areas and the similarities and difference of brain, minds, computers, robots, etc. Prereq., senior standing. Same as ASEN 5436 and ECEN 4831/5831.

**ASEN 5016-3. Space Life Sciences.** Familiarizes students with factors affecting living organisms in the reduced-gravity environment of space flight. Covers basic life support requirements, human physiological adaptations, and cellular-level gravity dependent processes with emphasis on technical writing and research proposal preparation. Prereq., graduate standing in engineering or senior with 3.25 GPA.

**ASEN 5116-3. Spacecraft Life Support Systems.** Provides a working knowledge of the systems needed to sustain human life in a spacecraft environment. Emphasis is on understanding functional requirements of a life support system; operational details of subsystem technologies; new concepts currently being considered in NASA's advanced programs; and conducting a technical trade study.

**ASEN 5216-3. Neural Signals and Functional Brain Imaging.** Same as ASEN 4216 and ECEN 5811.

**ASEN 5426-3. Neural Systems and Physiological Control.** Same as ASEN 4426 and ECEN 4821/5821.

**ASEN 5436-3. Brains, Minds, Computers.** Prereq., graduate standing. Same as ASEN 4436, ECEN 4831/5831.

**ASEN 5506-1. Bioastronautics Seminar.** Focuses on research areas in space flight medical and biological topics ranging from human responses to molecular-level concerns. Literature analysis and scientific presentations are expected. Emphasis is on biophysical mechanisms, comprehensive models, and related technology development.

## Computational and Analytic Methods

**ASEN 4047-3. Probability and Statistics for Aerospace Engineering Sciences.** Considers probability concepts and theory for better design and control of aerospace engineering systems. Includes descriptive and inferential statistical methods for experimental analysis. Also covers discrete and continuous random variable distributions, estimators, confidence intervals, regression, analysis of variance, hypothesis testing, nonparametric statistics, random processes, and quality control, including software models of same. Prereq., junior or graduate standing or instructor consent. Same as ASEN 5047.

**ASEN 5047-3. Probability and Statistics for Aerospace Engineering Sciences.** Same as ASEN 4047.

**ASEN 5227-3. Mathematics for Aerospace Engineering Sciences 1.** Provides an introduction to the methods and mathematics of advanced engineering analysis tailored to aerospace engineering applications. Topics include vector and tensor calculus, ordinary differential equations, and an introduction to the calculus of variations.

**ASEN 5307-3. Engineering Data Analysis Methods.** Gives students broad exposure to a variety of traditional and modern statistical methods for filtering and analyzing data. Topics include estimation methods, principal component analyses and spectral analyses. Introduces these methods and provides practical experience with their use. Students carry out problem assignments.

**ASEN 5417-3. Numerical Methods for Differential Equations.** Provides computational skills and basic knowledge of numerical methods for advanced courses in engineering/scientific computation using FORTRAN, C, or MATLAB. Prereq., APPM 2360 and instructor consent.

**ASEN 6427-3. Advanced Computational Fluid Dynamics.** Introduces computational techniques particularly applicable to high-speed gas flows that contain shocks. Complicated numerical methods are developed from relatively simple numerical modules. Prereq., ASEN 5417 or instructor consent.

## Global Positioning Systems

**ASEN 4090-3. Global Positioning Systems Applications.** Focuses on GPS technology, software development, and applications. Lectures will cover the principal concepts used in GPS, and weekly laboratories will apply that knowledge. The course will culminate in student design projects using GPS. Prereqs., APPM 2360 and GEEN 1300 or equivalent. Recommended junior/senior standing in engineering.

**ASEN 5090-3. Introduction to Global Navigation Satellite Systems.** Global Navigation Satellite Systems (GNSS) are important tools for navigation, science, and engineering. Introduces GNSS hardware, signal structure, algorithms, error sources, and modeling techniques. Programming experience is required. Restricted to graduate students.

## Remote Sensing

**ASEN 5235-3. Introduction to Atmospheric Radiative Transfer and Remote Sensing.** Examines fundamentals of radiative transfer and remote sensing with primary emphasis on the Earth's atmosphere; emission, absorption and scattering by molecules and particles; multiple scattering; polarization; radiometry and photometry; principles of inversion theory; extinction- and emission-based passive remote sensing; principles of active remote sensing; lidar and radar; additional applications such as the greenhouse effect and Earth's radiative energy budget. Same as ATOC 5235.

**ASEN 5245-3. Radar and Remote Sensing.** Examines active techniques of remote sensing, with emphasis on radar fundamentals, radar wave propagation, scattering processes, and radar measurement techniques and design. Examines specific radar systems and applications, such as synthetic aperture radar phased arrays for atmosphere, space, land, and sea applications. Restricted to seniors or graduate students in engineering.

**ASEN 5337-3. Remote Sensing Data Analysis.** Same as ASEN 4337.

**ASEN 6210-1. Remote Sensing Seminar.** Covers subjects pertinent to remote sensing of the Earth, including oceanography, meteorology, vegetation monitoring, and geology. Emphasizes techniques for extracting geophysical information from satellite data. Course requirement for Remote Sensing Certificate. Restricted to graduate students.

**ASEN 6220-3. Topics in Remote Sensing.** Covers infrared and microwave techniques for remote sensing, emphasizing oceanographic applications, fundamentals of electromagnetic radiation, remote sensing instrumentation (radars and radiometers), and conversion of sensory data to geophysical parameters, including sea surface topography, temperature, and atmospheric moisture. Prereq., graduate standing and instructor consent.

**ASEN 6337-3. Remote Sensing Data Analysis.** Reviews satellite remote sensing instrumentation and methods. Student teamwork involves real satellite data for applications in oceanography, atmospheric science, and terrestrial physics. Students develop problem-solving skills and use the internet to gather satellite and in situ data to address chosen problems. Prereq., GEEN 1300.

## Structures, Materials, and Structural Dynamics

**ASEN 2001-5. Aerospace 1: Introduction to Statics, Structures, and Materials.** Introduces analytical tools for statics and structural analysis. Topics include force/moment equilibrium, truss analysis, beam theory, stress/strain, failure criteria, and structural design. Matlab proficiency required. Prereqs., APPM 1360, GEEN 1300 or CSCI 1300, CHEN 1211, CHEM 1221, and PHYS 1110 (min. grade C). Coreq., ASEN 2002 or APPM 2350. Restricted to ASEN majors. Offered fall only.

**ASEN 3112-4. Structures.** Teaches Mechanics of Materials methods of stress and deformation analysis applicable to the design and verification of aircraft and space structures. It offers an introduction to matrix and finite element methods for truss structures, and to mechanical vibrations. Prereq., ASEN 2001, 2003, 2004, and APPM 2360 (min. grade C). Restricted to ASEN majors. Offered fall only.

**ASEN 4012-3. Aerospace Materials.** Studies aerospace grade aluminum, magnesium, nickel, and titanium alloys. Covers heat treatment, defect structures, failure mechanisms, corrosion and its prevention, the effect of space radiation on materials, and high and low temperature effects. Introduces composite materials with a lab design and experiment. Emphasizes the selection of materials in design with procedures for choosing materials rationally. Case studies include aerogels, carbides, composites, powder metallurgy, nanomaterials, and advanced materials manufacturing technologies. Prereq., ASEN 2001 or instructor consent.

**ASEN 4222-3. Materials Science for Composite Manufacturing.** Studies common matrix materials and the modifications and improvements of properties

which can be achieved by adding second phase reinforcements. Properties will be significantly affected by the design approach and by requirements, and by the procedure of adding reinforcements. Investigates polymer, ceramic and metallic materials. Explores manufacturing, fabrication and processing techniques. Evaluates future developments. Prereq., ASEN 3112 or equivalent, or instructor consent. Coreq., ASEN 4012 or instructor consent. Same as ASEN 5222.

**ASEN 4338-3. Computer Analysis of Structures.** Covers basic structural design concepts and finite element modeling techniques. Emphasizes use of finite element static and dynamic analysis to validate and refine an initial design. Introduces basic design optimization and tailoring. Proficiency in Matlab required. Prereq., ASEN 3112.

**ASEN 5007-3. Introduction to Finite Elements.** Introduces finite element methods used for solving linear problems in structural and continuum mechanics. Covers modeling, mathematical formulation, and computer implementation. Prereq., matrix algebra.

**ASEN 5012-3. Mechanics of Aerospace Structures.** Applies fundamental concepts of continuum mechanics, theory of elasticity, and energy methods to the analysis of structures. Prereqs., APPM 2360 and ASEN 2001, 2003, and 3112, or equivalent. Similar to MCEN 5023.

**ASEN 5022-3. Dynamics of Aerospace Structures.** Applies concepts covered in undergraduate dynamics, structures, and mathematics to the dynamics of aerospace structural components, including methods of dynamic analysis, vibrational characteristics, vibration measurements, and dynamic stability. Prereqs., ASEN 5012, 5227, or equivalent. Recommended prereq., MATH 3130.

**ASEN 5111-3. Introduction to Aeroelasticity.** Introduces static and dynamic aeroelasticity of airfoils and wings. Covers the classical aeroelasticity theory and gives a brief overview of computational methods applied to aeroelastic problems. Prereqs., ASEN 3111, MATH 3130, and MATH 4430, or equivalent, or instructor consent.

**ASEN 5122-3. Control of Aerospace Structures 1.** Introduces the basic problems in dynamic modeling and active control of large spacecraft and satellites. Includes system descriptions, model reduction, controller design, and closed-loop stability analysis. Prereq., ASEN 3200, graduate standing, or instructor consent.

**ASEN 5212-3. Composite Structures and Materials.** Develops the macro-mechanical and micromechanical theory of the elastic behavior and failure of composite laminates. Applies basic theory to a broad range of practical problems including the buckling and vibration of composite plates, columns, and shells. Prereq., senior standing in aerospace or mechanical engineering, or instructor consent.

**ASEN 5222-3. Materials Science for Composite Manufacturing.** Prereqs., ASEN 3112 and 4012 or equivalent, or instructor consent. Same as ASEN 4222.

**ASEN 5347-3. Math Methods in Dynamics.** Two-part graduate-level course on dynamics. Covers both flexible and rigid multibody analytical dynamics and finite element method for dynamics. Emphasizes formulations that naturally lead to easy computer implementation and stability, linearization, and modern rotational kinematics. Prereqs., graduate standing and instructor consent.

**ASEN 5517-3. Computational Methods In Dynamics.** Continuation of mathematical methods in dynamics. Covers numerical algorithms, computer implementation aspects, and treatment of constraints and nonlinear rotational computational techniques. Emphasizes the combined numerical and physics characterization for the solution of dynamical systems. Prereq., ASEN 5347.

**ASEN 6017-3. Nonlinear Finite Element Methods.** Covers modeling, formulation and numerical solution of nonlinear static problems in mechanics by finite element methods. Emphasizes treatment of geometric nonlinearities, stability assessment, incremental and iterative solution methods and basic issues of computer implementation. Prerequisites are an introductory graduate-level course in linear finite element methods and familiarity with linear algebra. A prior course in continuum mechanics is recommended. Formerly ASEN 5017. Credit not granted for this course and ASEN 5017.

**ASEN 6367-3. Advanced Finite Element Methods for Plates, Shells, and Solids.** Continues ASEN 5007. Covers more advanced FEM applications to linear static problems in structural and continuum mechanics. Focuses on model-

ing, formulation, and numerical solutions of problems modeled as plates, shells, and solids. Includes an overview of advanced variational formulations. Prereqs., introductory graduate level course in FEM and familiarity with linear algebra. Formerly ASEN 5367. Credit not granted for this course and ASEN 5367.

## Systems and Control

**ASEN 2003-5. Aerospace 3: Introduction to Dynamics and Systems.** Introduces the principles of particle and rigid body dynamics, vibrations, systems, and controls. Topics include kinematics, kinetics, energy methods, orbits, system modeling, and simple feedback control. Class includes experimental and design laboratory exercises for aerospace applications of dynamic principles. Prereqs., ASEN 2001 and APPM 2350 or MATH 2400 (min. grade C). Coreq., APPM 2360. Restricted to ASEN majors. Offered spring only.

**ASEN 3300-4. Aerospace Electronics and Communications.** Provides the fundamentals of electronics and communications widely used in aerospace engineering. Includes analog instrumentation electronics, data acquisition, digital electronics, and radio communication. Prereqs., ASEN 2003, PHYS 1120, and APPM 2360 (min. grade C). Restricted to ASEN majors. Offered spring only.

**ASEN 4114-3. Automatic Control Systems.** Methods of analysis and design of feedback control for dynamic systems. Covers nyquist, bode, and linear quadratic methods based on frequency domain and state space models. Laboratory experiments provide exposure to computation for simulation and real time control, and typical control system sensors and actuators. Prereqs., ASEN 3128 and 3200. Same as ASEN 5114.

**ASEN 5014-3. Linear Control Systems.** Introduces the theory of linear systems, including vector spaces, linear equations, structure of linear operators, state space descriptions of dynamic systems, and state feedback control methods. Prereq., ASEN 3200.

**ASEN 5024-3. Nonlinear Control Systems.** Introduces the analysis and control design methods for nonlinear systems, including Lyapunov and Describing Function methods. Prereq., ASEN 5014.

**ASEN 5114-3. Automatic Control Systems.** Same as ASEN 4114.

## Thermodynamics and Propulsion

**ASEN 3113-4. Thermodynamics and Heat Transfer.** Focuses on the applications of the first and second laws of thermodynamics to control volumes and teaches the fundamental concepts of different modes of energy and heat transfer. Learn to use these concepts in gas dynamics, high-speed vehicle design, environmental systems, and energy analysis. Prereqs., APPM 2350 or MATH 2400, and ASEN 2002 with a C or better grade. Restricted to ASEN majors. Offered fall only.

**ASEN 4013-3. Foundations of Propulsion.** Describes aerothermodynamics and design of air-breathing engines, including ram jets, turbo jets, turbo fans, and turbo prop engines. Prereqs., ASEN 3113 and APPM 2360 with a C or better grade. Offered spring only.

**ASEN 5013-3. Advanced Propulsion.** Chemical combustion calculations for multicomponent gases and application to air-breathing and rocket propulsion systems; performance criteria and scaling laws; introduction to chemical reaction rates; combustion instability and nozzle heat transfer; ion propulsion and mhd generators. Prereq., ASEN 4013 or instructor consent.

**ASEN 5053-3. Rocket Propulsion.** An in depth presentation of the theory, analysis, and design of rocket propulsion systems. Liquid and solid propellant systems are emphasized with an introduction to advanced propulsion concepts. Nozzle and fluid flow relationships are reviewed for background. Prereq., senior standing in ASEN or MCEN, or instructor consent.

**ASEN 5063-3. Gas Turbine Propulsion.** Designed to teach the theory, analysis and design of modern gas turbine engines used for aircraft propulsion. Will deal with cycle and performance analyses, and analysis and design of compressors, turbines, intakes, nozzles and combustors as well as component matching. Prereq., ASEN 4013 or equivalent.

**ASEN 6013-3. High Speed Propulsion.** Chemical combustion calculations for multicomponent gases and application to air-breathing and rocket propulsion systems; performance criteria and scaling laws; introduction to chemical

reaction rates; combustion instability and nozzle heat transfer; ion propulsion and mhd generators. Prereq., ASEN 4013 or instructor consent.

## Specialized Courses

**ASEN 2519 (1-3). Special Topics.** Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the lower-division level. Course content is indicated in the online Schedule Planner. Prereq., varies. Restricted to Engineering students.

**ASEN 2849 (1-3). Independent Study.** Study of special projects agreed upon by student and instructor. May be repeated up to 9 total credit hours. Prereq., instructor consent.

**ASEN 3519 (1-3). Special Topics.** Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the online Schedule Planner. Prereq., varies.

**ASEN 3930-6. Aerospace Engineering Cooperative Education.** Students will participate in a previously arranged, department-sponsored cooperative education program with a government agency or industry. Recommended prereq., GPA above 3.0. Restricted to juniors/seniors majors.

**ASEN 4519 (1-3). Special Topics.** Studies specialized aspects of the aerospace engineering sciences or innovative treatment of required subject matter at the upper-division level. Course content is indicated in the online Schedule Planner. Prereq., varies.

**ASEN 4849 (1-6). Independent Study.** Special projects agreed upon by student and instructor. Instructor consent required.

**ASEN 4859 (1-6). Undergraduate Research.** Assigns a research problem on an individual basis. Instructor consent required.

**ASEN 5519 (1-3). Selected Topics.** Reflects upon specialized aspects of aerospace engineering sciences. Course content is indicated in the online Schedule Planner. Prereq., varies.

**ASEN 5849 (1-6). Independent Study.** Study of special projects.

**ASEN 5940 (3-6). Engineering Research Internship.** Grants credit to foreign visiting graduate students for conducting research within the Aerospace Engineering Sciences department. Credits can be transferred to the student's home institution. CU-Boulder students may also receive credit for conducting research outside of the university, either overseas or in the US. Restricted to students in final year of undergraduate work and graduate students from CU-Boulder or foreign institutions.

**ASEN 6009 (1-2). Special Topics Seminar.** Presents research and developments in each department's focus areas.

**ASEN 6107-3. Nonlinear Finite Element Methods.** Continuation of ASEN 5007. Covers the formulation and numerical solution of nonlinear static structural problems by finite element methods. Emphasizes the treatment of geometric nonlinearities and structural stability. Prereq., ASEN 5007.

**ASEN 6519 (1-3). Special Topics.** Reflects upon specialized aspects of aerospace engineering sciences. Course content is indicated in the online Schedule Planner. Prereq., varies.

**ASEN 6849 (1-6). Independent Study.** Studies special projects agreed upon by student and instructor.

**ASEN 6950 (1-6). Master's Thesis.**

**ASEN 8990 (16-24). Doctoral Thesis.**

## Architectural Engineering

### Building Systems Engineering

**AREN 2050-3. Engineering Systems for Buildings.** Provides an overview of the structural, mechanical, and electrical systems used in buildings, with special emphasis on sustainable practices for building design. Includes team project work in studying the systems in a building on the CU-Boulder campus. Coreq., AREN 1017.

**AREN 2110-3. Thermodynamics.** Explores fundamental principles of thermodynamics, including first and second law of thermodynamics, thermophysical properties, power and refrigeration cycles, gas mixtures and psychrometrics. Computing in the context of engineering problems is introduced. Prereq., PHYS 1110. Coreq., APPM 1360.

**AREN 2120-3. Fluid Mechanics and Heat Transfer.** Explores fundamental principles of fluid dynamics and heat transfer. Topics include fluid statics, momentum, and energy conservation, laminar and turbulent viscous flow, convection heat transfer, conduction heat transfer, heat exchangers, and heat transfer. Prereqs., APPM 2350 and AREN 2110. Coreq., APPM 2360.

**AREN 3010-3. Mechanical Systems for Buildings.** Examines psychrometrics, thermal comfort, building heating and cooling loads, fluid flow basics, and HVAC components and systems. Prereqs., AREN 2110, 2120, and 3050.

**AREN 3050-3. Environmental Systems for Buildings 1.** Introduces the operation and design of building systems for climate control, water and drainage, life safety, electrical supply, illumination, transportation (elevators and escalators), and noise control. For non-engineering majors.

**AREN 3060-3. Environmental Systems for Buildings 2.** Continues the operation and design of building systems for climate control, water and drainage, life safety, electrical supply, illumination, transportation (elevators and escalators), and noise control. For non-engineering majors.

**AREN 3130-3. Building Energy Laboratory.** Two lectures, one 3-hour lab per week. Offers a laboratory course on mechanical systems in buildings, focusing on building applications of thermodynamics, fluid dynamics, and heat transfer. Applications include solar collectors, pumps, fans, heat exchangers, and air conditioning and refrigeration systems. Prereq., AREN 3010.

**AREN 3140-3. Illumination Laboratory.** Introduces the measurement of photometric and psychophysical quantities used in lighting. Experience is acquired in using light measurement instruments to evaluate lighting equipment and luminous environments. Prereq., AREN 3540.

**AREN 3540-3. Illumination I.** Studies the fundamentals of architectural illumination. Introduces and applies basic principles and vocabulary to elementary problems in the lighting of environments for the performance of visual work and the proper interaction with architecture. Prereq., AREN 3060.

**AREN 4010-3. HVAC System Controls.** Design-oriented course devoted to solar heating of buildings. Topics includes solar radiation prediction, methods of solar collection and thermal conversion, solar system analysis, economic analysis of solar systems, and solar design optimization. One of several capstone courses available to architectural engineering students. Prereq., AREN 2010. Same as CVEN 5010.

**AREN 4110-3. HVAC Design 1.** Highlights the design of heating, ventilating, and air conditioning (HVAC) systems for buildings. Covers HVAC systems description, load estimating, code compliance, duct design, fan systems, applied psychrometrics, cooling and heating coils, filters, hydronic systems, piping, and pumps. One of several capstone courses available to architectural engineering students. Prereq., AREN 3010. Same as CVEN 5110.

**AREN 4540-3. Exterior Lighting Systems.** Engages students in exploring and solving lighting problems for exterior environments. Provides an understanding of the design criteria and lighting equipment used in three primary exterior applications: parking lots and roadways, floodlighting of buildings, and sports facilities. Prereq., AREN 3540. Recommended prereqs., AREN 3140 and 4550. Same as CVEN 5540.

**AREN 4550-3. Illumination 2.** Applies the principles studied in Illumination 1. Provides further study in architectural lighting design methods. Uses lighting studio work to develop a broad knowledge of lighting equipment, design methods, and their application in a series of practical design problems in modern buildings. One of several capstone courses available to architectural engineering students. Prereq., AREN 3540.

**AREN 4560-3. Luminous Radiative Transfer.** Teaches fundamentals of radiative exchange as applied to illumination engineering. Describes and uses principal numerical techniques for radiative transfer analysis. Applies techniques to lighting design and analysis. Prereq., AREN 3540.

**AREN 4570-3. Building Electrical Systems Design 1.** Introduces the generation and distribution of electrical power. Focuses on understanding the loads,

control, and protection of secondary electrical distribution systems in building. Applies the national electric code to residential and commercial buildings. Prereq., ECEN 3030.

**AREN 4580-3. Daylighting.** Studies design process and lighting calculation techniques for the synthesis and analysis of daylighting in modern buildings. Covers integration with electric lighting and other building subsystems. Prereq., AREN 3540 and AREN 4560.

**AREN 4590-3. Computer Graphics in Lighting Engineering.** Studies the numerical methods and computer implementation of computer graphics visualization for architectural lighting engineering and design. Implements finite element radiative transfer and ray-tracing in computer programs. Studies the use of computer graphics visualization in lighting analysis. Prereq., AREN 3540 and 4560.

## Structures

**AREN 4035-3. Architectural Structures 1.** Analyzes basic structural systems. Covers principles of mechanics and mechanical properties of materials and analysis and design of trusses, arches, and cable structures. For nonengineering students; does not apply toward an engineering degree. Prereq., PHYS 1110, and APPM 1350 or MATH 1300.

**AREN 4045-3. Architectural Structures 2.** Analyzes basic structural systems. Covers principles of mechanics as applied to the design of flexural members, columns, continuous beams, and rigid frames. For nonengineering students; does not apply toward an engineering degree. Prereq., AREN 4035.

**AREN 4315-2. Design of Masonry Structures.** Covers modern masonry construction; properties and behavior of the reinforced masonry component materials, clay and concrete masonry units, mortar, grout, and steel reinforcement; vertical and lateral load types and intensities; and design of reinforced masonry walls, beams, and columns by working stress and strength design methods. Prereq., CVEN 3525.

## Construction

**AREN 2406-3. Introduction to Building Construction.** Covers the broad subject of building materials, assembly details, and their method of construction. Includes codes and classifications, foundations, wood, steel, concrete, masonry, cladding, doors and windows, interiors, and finishes. Formerly AREN 3406.

**AREN 3406-3. Introduction to Building Construction.** Covers the broad subject of building materials, assembly details, and their method of construction. Includes codes and classifications, foundations, wood, steel, concrete, masonry, cladding, doors and windows, interiors, and finishes.

**AREN 4416-3. Construction Costs and Estimating.** Introduces building construction costs accounting and controls, analysis of direct and indirect cost fundamentals and collecting systems, methods engineering and value engineering. Includes a study of types of estimates, quantity take-off techniques and pricing applications, and preparation of a detailed estimate for a building project including all cost analyses, a complete quantity survey, development of unit prices, and final assembly of the bid proposal. Prereq., senior standing or instructor consent.

**AREN 4420-3. Cost Engineering.** Focuses on conceptual cost estimating and evaluation techniques to support engineering design. Topics include parametric estimating, stochastic estimating, value engineering, constructability concepts, and life-cycle costing. Prereq., AREN 3406. Recommended prereq., CVEN 3246.

**AREN 4466-3. Construction Planning and Scheduling.** Comprehensively studies construction management, including the contractor's role in preconstruction and construction activities; the construction contract; bonds and insurance; and the particular application of CPM/PERT techniques to the planning, scheduling, and control of a construction project. Prereq., AREN 4416.

## Miscellaneous

**AREN 1027-3. Engineering Drawing.** Introduces engineering drawing including sections and dimensioning, print readings, and computer 3D modeling.

**AREN 1316-1. Introduction to Architectural Engineering.** Surveys the broad subject of architectural engineering and professional practices. Includes professional design services, design documents, methods of construction delivery, materials for construction, codes and standards, life safety, professional ethics, structural systems, mechanical systems, electrical systems, and building systems integration.

**AREN 4317-4. Architectural Engineering Design.** Provides a capstone experience to AREN students. Students design a modest commercial building and complete an integrated engineering design of the building systems executed for the conceptual, schematic, and design development phases. Student teams work on life safety, structural, mechanical, and electrical design. Each stage has a professional-quality design document. All members of AREN and some structural faculty participate in the teaching and evaluation of designs. Prereqs., AREN 3010, 3540, 4570, CVEN 3246, 3525, and ARCH 4010. Recommended prereqs., AREN 4110, 4416, 4550 and CVEN 4545 and 4555.

## Special Topics

**AREN 4830 (1-3). Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. May be repeated up to 12 total credit hours. Prereq., instructor consent required.

**AREN 4837-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

**AREN 4849 (1-3). Independent Study.** Offers an independent, in-depth study, research, or design in a selected area of architectural engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering. Numbered AREN 4840 through AREN 4849.

## Chemical and Biological Engineering

**CHEN 1000-3. Creative Technology.** Lect. Introduces undergraduate arts and sciences students to the most recent concepts in technology and how these concepts impact all aspects of life, such as health, the health of the planet, and social structures. Engineering students should consult an advisor before registering for this course. Approved for arts and sciences core curriculum: natural science.

**CHEN 1211-3. General Chemistry for Engineers.** Lect. A one-semester course designed to meet the general chemistry requirement for engineering students. Topics include stoichiometry; thermodynamics; gases, liquids, and solids; equilibrium; acids and bases; bonding concepts; kinetics; reactions; and materials science. Examples and problems illustrate the application of chemistry to engineering subdisciplines. Restricted to students in the College of Engineering and Applied Science; one year of high school chemistry or CHEM 1001 or 1021 (min. grade C-); and high school algebra. Not recommended for students with grades below B- in CHEM 1001 or 1021. Coreq., CHEM 1221. Credit not granted for this course and CHEM 1111, 1113/1114, 1251, or 1351.

**CHEN 1300-1. Introduction to Chemical Engineering.** Meets for one lecture per week. Introduces chemical engineering emphasizing history of the profession, curriculum, chemical industry, and industrial chemistry. Includes industry visits, oral presentations, faculty and professional meetings, and development of a goals statement.

**CHEN 2120-3. Chemical Engineering Material and Energy Balances.** Provides a basic understanding of chemical engineering calculations involving material and energy balances around simple chemical processes. Prereq., CHEN 1211 and GEEN 1300 (min. grade C-).

**CHEN 2121-1. Chemical Engineering Material and Energy Balances-Honors.** Provides a supplementary learning experience for students enrolled in Chemical Engineering Material and Energy Balances (CHEN 2120). Coreq., CHEN 2120. Restricted to CHEN, CBEN, and EVEN honors students.

**CHEN 2810-3. Biology for Engineers.** Develops a basic understanding of the science of biology, including an introduction to the disciplines of biochemistry, cell organization, metabolism, genetics, genomics, molecular biology, recombinant DNA technology and evolution. Provides a basic introduction to

several key techniques used in biological engineering laboratories. Uses examples of complex and creative structures engineered by natural processes.

**CHEN 2820-3. Foundations of Bioengineering.** Introduces fundamental science and engineering principles on which bioengineering is based. Includes a study of the structure/function of biomolecules, cell communication, nutrient supply, metabolism, excretion, fluid flow in the circulatory system, bioinstrumentation, drug delivery, and tissue engineering. Prereq., CHEN 2810 or MCDB 1150 or EBIO 1210 or equivalent AP credit.

**CHEN 2840 (1-4). Independent Study.** Available to sophomores with approval of Department of Chemical Engineering. Subject arranged to fit needs of student.

**CHEN 3010-3. Applied Data Analysis.** Teaches students to analyze and interpret data. Topics include engineering measurements, graphical presentation and numerical treatment of data, statistical inference, and regression analysis. Prereqs., GEEN 1300 and APPM 2360.

**CHEN 3130-2. Chemical Engineering Laboratory 1.** One four-hour lab session per week. Investigates chemical engineering fluid flow, heat transfer, and thermodynamics. Emphasizes communication by written reports and oral presentations as well as laboratory safety. Prereq., CHEN 3010, 3200, 3320 and either CHEN 3210 or MCEN 3022 (all min. grade C-).

**CHEN 3200-3. Chemical Engineering Fluid Mechanics.** Introduces fluid mechanics and momentum transfer, emphasizing the application of these principles to chemical engineering systems. Prereqs., APPM 2350 and either CHEN 2120 or MCEN 2023 (all grade C-). Coreq., APPM 2360. Same as GEEN 3853.

**CHEN 3210-3. Chemical Engineering Heat Transfer.** Examines conservation and transfer of thermal energy. Focuses on conduction and convection of heat in the context of chemical processes, with a special focus on heat exchangers. Also studies thermal radiation. Prereq., CHEN 2120, GEEN 1300 and either CHEN 3200 or MCEN 3021 (all min. grade C-).

**CHEN 3220-3. Chemical Engineering Separations and Mass Transfer.** Studies separation methods including distillation, absorption, and extraction, and graphical and computer-based solutions to separation problems. Also studies mass transfer rate processes, including diffusion, microscopic material balances, and correlations for mass transfer coefficients. Applies mass transfer rate theory to packed and tray columns. Prereq., CHEN 3200 and CHEN 3320. Coreq., CHEN 3210 or MCEN 3022.

**CHEN 3320-3. Chemical Engineering Thermodynamics.** Applies thermodynamic principles to nonideal systems, phase equilibrium, chemical equilibrium, power generation, refrigeration, and chemical processes. Prereqs., CHEN 2120 and either CHEM 4511 or 4521 (all min. grade C-).

**CHEN 3321-1. Chemical Engineering Thermodynamics Honors.** Incorporates student projects in conjunction with the standard teaching in CHEN 3320 where thermodynamic principles are applied to non-ideal systems, phase equilibrium, chemical equilibrium, power generation, refrigeration, and chemical processes. Prereqs., CHEN 2120 and either CHEM 4511 or CHEM 4521. Restricted to honors students.

**CHEN 3838-3. Special Topics.** May be repeated up to 6 total credit hours.

**CHEN 3840 (1-4). Independent Study.** Available to juniors with approval of the Department of Chemical Engineering. Subject arranged to fit needs of the student.

**CHEN 3930-6. Chemical Engineering Cooperative Education.** Students enrolled in this course participate in a previously arranged, department-sponsored cooperative education program. Prereqs., CHEN 2120 and GPA higher than 2.85. GPA higher than 3.00 strongly recommended.

**CHEN 4010-2. Chemical Engineering Senior Thesis 1.** Provides an opportunity for advanced students to conduct exploratory research in chemical engineering.

**CHEN 4020-2. Chemical Engineering Senior Thesis 2.** Continuation of CHEN 4010. CHEN 4010 and 4020 can substitute for CHEN 4130.

**CHEN 4090-1. Undergraduate Seminar.** Provides chemical engineering career and professional information, facilitates contact with faculty and industry representatives, and improves communication and leadership skills. Consists

of a series of seminars and field trips and requires a research project involving a written and oral report.

**CHEN 4130-2. Chemical Engineering Laboratory 2.** Involves planning and execution of chemical engineering experiments on mass transfer operations, separations, and chemical reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports, and oral presentations. Prereqs., CHEN 3130, 3220, and 4330 (all min. grade C-).

**CHEN 4330-3. Chemical Engineering Reaction Kinetics.** Introduces chemical kinetics and chemical reactor design. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer, catalytic reactions, and multiple steady states in reactors. Prereq., CHEN 3320 (min. grade C-). Coreq., CHEN 3210 or MCEN 3022.

**CHEN 4440-3. Chemical Engineering Materials.** Introduces materials engineering, including properties of polymers, metals, ceramics, and semiconductors, especially as related to chemical engineering processes. Prereq., CHEN 3320 (min. grade C-).

**CHEN 4450-3. Polymer Chemistry.** Lect. Introduces polymer science with a focus on polymer chemistry and polymerization reactions. Focuses on polymerization reaction engineering and how polymer properties depend on structure. Prereq., CHEN 4330 and CHEM 3311 or instructor consent required. Same as CHEN 5450.

**CHEN 4460-3. Polymer Engineering.** Introductory polymer engineering course reviewing basic terminology and definitions; the properties and synthetic routes of important industrial polymers; and processing of polymers and their applications. Prereq., CHEM 3311 and CHEN 3320 (min. grade C-) or equivalent, or instructor consent. Same as CHEN 5460.

**CHEN 4520-3. Chemical Process Synthesis.** Studies applied chemical process design including equipment specification and economic evaluation. Prereqs., CHEN 3010, 3210, 3220, 3320 and 4330 (all min. C-).

**CHEN 4530-2. Chemical Engineering Design Project.** Provides a team-based capstone design experience for chemical engineering students. Projects are sponsored by industry and student design teams collaborate with industrial consultants. Projects consider chemical process and product design with emphasis on economic analysis. Deliverables include an oral mid-project design review, a final oral presentation and final written design report. Prereq., CHEN 4520.

**CHEN 4570-4. Instrumentation and Process Control.** Examines principles of control theory and their application to chemical processes. Focuses on single-loop feedback and feedforward control. Laboratory sessions cover measurement fundamentals, signal transmission, dynamic testing, control system synthesis, and implementation and adjustment. Prereqs., CHEN 3010, 3220, 4330 and APPM 2360 (all min. grade C-).

**CHEN 4580-3. Numerical Methods for Process Simulation.** Covers use of macroscopic and microscopic balances for development of mathematical models to describe common chemical engineering unit operations. Also includes numerical methods for solution of model equations. Prereqs., CHEN 3210 and 3220.

**CHEN 4630-1. Intellectual Property Law and Engineering.** Learn the fundamentals of the various types of intellectual property, obtain the ability to search the USPTO database for patents, learn the difference between provisional patents, utility patents and foreign patents, and learn the timing requirements related to the filing of patents and public disclosure, use, and/or sale of an invention. Restricted to seniors. Same as CHEN 5630.

**CHEN 4650-3. Particle Technology.** Aims to identify the important physical mechanisms occurring in processes involving particles, formulate and solve mathematical descriptions of such processes, and analyze experimental and theoretical results in both a qualitative and quantitative manner. Teaches students to apply this knowledge to the design of particulate systems. Conveys the breadth and depth of natural and industrial applications involving particulates. Prereq., APPM 2360 and CHEN 3200 or MCEN 3021. Same as CHEN 5650.

**CHEN 4670-3. Environmental Separations.** Lect. Covers traditional, as well as new, chemical separations processes that have environmental applications. Includes chemically benign processing (pollution prevention) as well as approaches to address existing pollution problems. Prereqs., senior or graduate student standing and CHEN 2120. Same as CHEN 5670.

**CHEN 4680-3. Environmental Process Engineering.** Lect. Surveys the field of environmental process engineering and covers the topics of waste minimization and pollution, air pollution control, water pollution control, hazardous waste control, risk assessment and management, and ecological systems. Prereq., senior or graduate standing in engineering. Same as CHEN 5680.

**CHEN 4800-3. Bioprocess Engineering.** Lect. and lab. Reviews the recent developments in the fields of microbiology, molecular genetics, and genetic engineering that are of commercial value and benefit to mankind. Covers engineering implementation of such biological processes. Prereq., senior or graduate standing in engineering or science, or instructor consent. Same as CHEN 5800.

**CHEN 4801-3. Pharmaceutical Biotechnology.** Focuses on the engineering needed to bring therapeutic products derived from living organisms (e.g., proteins, peptides, DNA, RNA) from the production plant to the patient. Covers the challenges of keeping these products "active" as they are stored, shipped, and administered to patients. Prereq., CHEN 3320. Coreq., CHEN 4330.

**CHEN 4805-3. Biomaterials.** Provides an overview of biomaterials. Covers major classes of materials used in medical applications, properties, degradation mechanisms, and characterization methods, foreign body response, methods to control physiological response to biomaterial surfaces, biocompatibility, biomaterials used in soft and hard tissue replacements, drug delivery devices and tissue engineering, and design criteria for developing a material for a given biological application. Prereq., CHEN 2820 and CHEM 3331. Same as CHEN 5805.

**CHEN 4810-2. Biological Engineering Laboratory.** Involves planning and execution of chemical engineering experiments on mass transfer operations, bioseparations, and biological reactors. Interprets experimental data with theoretical principles and statistical analysis. Emphasizes communication with written memos, full reports and oral presentations. Prereqs., CHEN 2810 and 3130. Coreq., CHEN 4820.

**CHEN 4820-3. Biochemical Separations.** Lect. and lab. Presents purification methods, mass transfer coefficients, problems specific to biologicals, and scale-up of processes. Also covers chromatography, phase extraction, supercritical fluids, sedimentation, precipitation, electrophoresis, dialysis, affinity techniques, cell separation, application of separations to bioreactors, and comparison of batch and continuous processes. Prereq., CHEN 2810, 3220, and senior standing in engineering. Same as CHEN 5820.

**CHEN 4830-3. Chemical Engineering Biokinetics.** Introduces chemical kinetics, chemical reactor design, and biological kinetics. Involves mass and energy balances for steady-state and transient reactor systems. Also covers residence time distribution, mass transfer, catalytic reactions, multiple steady states in reactors, enzyme kinetics, metabolic networks, and cell growth kinetics. Prereqs., CHEN 2810, 3210 and 3320. Restricted to CHEN and CBEN majors.

**CHEN 4838-3. Tissue Engineering and Medical Devices.** Provides an introduction to the fundamentals of tissue engineering. In addition, introduces students to important professional, societal, and entrepreneurial issues in the field by examining case studies in which drugs and medical devices have been developed and FDA approved for clinical use. Intended for juniors who are also taking separations and mass transfer and kinetics; students also must have taken biology. *See also CHEN 4838, below.*

**CHEN 4838-3. Nanotechnology.** Presents fundamental chemical and physical concepts that give rise to the unique optical, electronic, and magnetic properties of nanoscale materials. Introduces important synthetic routes for producing nanomaterials, and interparticle forces governing colloidal behavior and self-assembly. Discusses current and potential applications in catalysis, biomedicine, renewable energy, and other fields. Prereq., senior standing in engineering or instructor consent. *See also CHEN 4838, above.*

**CHEN 4840 (1-4). Independent Study.** Available to seniors with approval of chemical engineering department. Subject arranged to fit needs of student.

**CHEN 5090-1. Seminar in Chemical Engineering.** Required of all chemical engineering graduate students. Includes reports on research activities and on special current topics.

**CHEN 5127-3. Applied Statistics for the Manufacturing and Process Industries.** Discusses the concepts and techniques of applied statistics essential to quality control and product/process improvement. Includes computer control

(SQC/SPC), sampling methods and time series analysis, and methods of experimental design. Prereq., MCEN 4120. Same as CVEN 5127 and MCEN 5126.

**CHEN 5128-3. Applied Statistics In Research and Development.** Students learn current and emerging statistical methods that are appropriate to experimentation in research and development activities. Statistical design of experiments and model fitting is emphasized. Prereq., one introductory probability/statistics course. Same as MCEN 5146.

**CHEN 5210-4. Transport Phenomena.** Considers continuum mechanics, emphasizing fundamental relationships for fluid mechanics and heat transfer and their applications to engineering problems. Prereq., senior or graduate standing and undergraduate courses in fluid mechanics, heat transfer, and differential equations.

**CHEN 5220-3. Mass Transport.** Examines fundamentals of mass transport with particular attention to microscopic balances in complex systems, such as those involving multiple components, chemical reaction, simultaneous heat and mass transport, and/or high mass flux. Prereq., CHEN 5210, undergraduate mass transfer, and familiarity with vector and tensor calculus.

**CHEN 5333-3. Research Methods and Ethics.** Prepares graduate students to carry out independent research. Research ethics, laboratory skills, experimental methods, critical thinking, presentations, proposal preparation and career planning are discussed. Independent research project carried out under direction of chemical engineering faculty. Prereq., graduate standing.

**CHEN 5343-1. Research Methods and Ethics Seminar.** Prepares graduate students to carry out independent research. Focuses on topics such as safety, ethics, communication skills, data analysis, intellectual property considerations, and time management.

**CHEN 5360-3. Catalysis and Kinetics.** Studies principles of chemical kinetics and catalytic reactions, emphasizing heterogeneous catalysis. Coreq., CHEN 4330, or prereq., CHEM 4551 and instructor consent, or graduate standing in CHEM or CHEN.

**CHEN 5370-3. Intermediate Chemical Engineering Thermodynamics.** Reviews fundamentals of thermodynamics, application to pure fluids and mixtures, and physical equilibrium and changes of state. Examines the equation of state and computation of fluid properties for pure fluids, mixtures, and solutions. Also looks at relations between thermodynamics and statistical mechanics. Prereq., undergraduate thermodynamics (CHEN 3320 or equivalent).

**CHEN 5390-3. Chemical Reactor Engineering.** Studies ideal and nonideal chemical reactors, including unsteady state behavior, mixing effects, reactor stability, residence time distribution, and diffusion effects. Prereq., undergraduate course in chemical reactor design/kinetics.

**CHEN 5420-3. Physical Chemistry and Fluid Mechanics of Interfaces.** Covers thermodynamics of interfaces and surface tension measurement; adsorption at liquid-gas, liquid-liquid, and solid-gas interfaces; monolayers; conservation equations for a fluid interface; rheology of interfaces; surface tension driven flows; contact angle and wettability; and double layer phenomena. Prereq., CHEN 3200 or equivalent.

**CHEN 5450-3. Polymer Chemistry.** Same as CHEN 4450.

**CHEN 5460-3. Polymer Engineering.** Same as CHEN 4460.

**CHEN 5630-1. Intellectual Property Law and Engineering.** Restricted to graduate students or instructor consent required.

**CHEN 5650-3. Particle Technology.** Same as CHEN 4650.

**CHEN 5670-3. Environmental Separations.** Same as CHEN 4670.

**CHEN 5680-3. Environmental Process Engineering.** Same as CHEN 4680.

**CHEN 5740-3. Analytical Methods in Chemical Engineering.** Presents applied analytical and numerical mathematical methods in the context of chemical engineering problems. Topics include modeling techniques, algebraic equations, and ordinary and partial differential equations. Prereq., senior or graduate standing; working knowledge of computing, calculus, differential equations, linear algebra, and vector operations; and undergraduate courses in physics, fluid mechanics, heat transfer, and reaction engineering.

**CHEN 5750-3. Numerical Methods in Chemical Engineering.** Covers numerical methods for solving ordinary differential, partial differential, and integral equations. These principles are employed to develop, test, and assess



computer programs for solving problems of interest to chemical engineers. Prereq., graduate standing or instructor consent.

**CHEN 5800-3. Bioprocess Engineering.** Same as CHEN 4800, except that a major term report is required.

**CHEN 5805-3. Biomaterials.** Same as CHEN 4805.

**CHEN 5820-3. Biochemical Separations.** Same as CHEN 4820, except that reports and extra reading are required.

**CHEN 5830-1. Introduction to Modern Biotechnology.** Introduces students to the biotechnology enterprise. Topics include the biotechnology industry and profession, the various academic disciplines of biotechnology, intellectual property, financing, and ethics.

**CHEN 5840 (1-4). Independent Study.** Available to MS and PhD students.

**CHEN 5900-3. Pharmaceutical Biotechnology.** Incorporates biochemistry, pharmaceutical science, and engineering for application in the pharmaceutical industry. Emphasizes microscale mechanisms affecting drug delivery, bioavailability, and stability. Specific topics include thermodynamics of macromolecular conformational stability, crystallization kinetics, interfacial phenomena, and industrial protein folding. Prereq., graduate standing.

**CHEN 6210-3. Microhydrodynamics of Suspensions and Colloids.** Focuses on fluid mechanics and colloid science of suspensions of particles, cells, and drops. Covers fundamentals, applications, and research frontiers. Prereq., CHEN 5210 or equivalent.

**CHEN 6820-3. Biochemical Engineering Fundamentals.** Covers design and operation of fermentation processes, microbial and enzyme kinetics, multiple substrate and multiple species of fermentation, regulation of enzyme activity, energetics of cellular growth, immobilized enzyme and cell reactors, and transport phenomena in microbial systems and downstream processing. Prereq., graduate standing in CHEM, CHEN, or MCDB, or instructor consent.

**CHEN 6940. Master's Candidate.**

**CHEN 6950 (1-6). Master's Thesis.**

**CHEN 8990 (1-10). Doctoral Thesis.**

## Civil and Environmental Engineering

### Building Systems

**CVEN 4700-3. Sustainability and the Built Environment.** Introduces fundamental concepts of sustainability and sustainable development. Special emphasis on understanding the interaction of the built environment with natural systems and the role of technical and non-technical issues in engineering decisions. Open to engineering and non-engineering students. Same as CVEN 5700.

**CVEN 5010-3. HVAC System Controls.** Treats the theoretical and practical design of control systems for heating, ventilating, and air conditioning of both residential and commercial buildings. Discusses computer energy management system design. Prereq., AREN 3010 or equivalent. Same as AREN 4010.

**CVEN 5020-3. Building Energy Audits.** Analyzes and measures performance of HVAC systems, envelopes, lighting and hot water systems, and modifications to reduce energy use. Emphasizes existing buildings. Prereq., AREN 3010 or equivalent.

**CVEN 5030-3. Architectural Lighting Equipment Design.** Covers the specification and design of nonimaging optical systems for architectural lighting equipment reflector design. Develops and uses computer software to design optics that are prototyped and tested in the laboratory. Prereq., AREN 3540 or CVEN 5830.

**CVEN 5040-3. Lighting Systems Engineering.** Introduces architectural lighting, including vision and perception, lighting equipment and its characteristics, calculations and analysis, and the process of lighting design.

**CVEN 5050-3. Advanced Solar Design.** Predicts performance and analyzes economics of high temperature, photovoltaic, and other innovative solar systems. Also includes performance prediction methods for solar processes. Prereq., coursework in thermodynamics, fluid mechanics and heat transfer.

**CVEN 5060-3. Advanced Passive Solar Design.** Emphasizes design-oriented treatment of passive solar systems. Treats generic types of systems and their performance and cost. Covers passive system construction and daylighting. Prereq., AREN 2010 or equivalent.

**CVEN 5070-3. Thermal Analysis of Buildings.** Examines response factors, conduction transfer functions, and weighting factors for dynamic analysis of building envelopes. Also studies radiative and convective exchange in buildings, internal gains, and infiltration analysis as modeled in hourly simulations. Prereq., AREN 3010 or equivalent.

**CVEN 5080-3. Computer Simulation of Building Energy Systems.** Introduces major simulation programs for analysis of building energy loads and system performance. Focuses on one hourly simulation program to develop capability for analysis of multizone structure. Prereq., AREN 4110 or CVEN 5110.

**CVEN 5090-1. Building Systems Seminar.**

**CVEN 5110-3. HVAC Design 1.** Explores design of heating, ventilating, and air conditioning (HVAC) systems for buildings. Covers HVAC systems description, load estimating, code compliance, duct design, fan systems, applied psychrometrics, cooling and heating coils, filters, hydronic systems, piping, and pumps. Prereq., AREN 3010 or equivalent. Same as AREN 4110.

**CVEN 5540-3. Exterior Lighting Systems.** Engages students in exploring and solving lighting problems for exterior environments. Provides an understanding of the design criteria and lighting equipment used in three primary exterior applications: parking lots and roadways, floodlighting of buildings, and sports facilities. Prereq., AREN 3540. Recommended prereqs., AREN 3140 and 4550. Same as AREN 4540.

**CVEN 5700-3. Sustainability and the Built Environment.** Same as CVEN 4700.

**CVEN 5830-3. Special Topics for Seniors/Grads.** Prereq., instructor consent. May be repeated up to 9 total credit hours.

**CVEN 6940-6949-3. Master's Degree Candidate.**

**CVEN 8990-8999 (1-10). Doctoral Thesis.** A minimum of 30 credit hours is required.

### Mechanics

**CVEN 2121-3. Analytical Mechanics 1.** Examines vector treatment of force systems and their resultants; equilibrium of frames and machines, including internal forces and three-dimensional configurations; static friction; properties of surfaces, including first and second moments; hydrostatics; and minimum potential energy and stability. Prereq., PHYS 1110. Prereq. or coreq., APPM 2350. Same as GEEN 3851.

**CVEN 3111-3. Analytical Mechanics 2.** Examines vector treatment of dynamics of particles and rigid bodies including rectilinear translation, central-force, free and forced vibration, and general motion of particles; kinematics of rigid bodies; the inertia tensor; Euler's equations of motion; and energy and momentum methods for particles, systems of particles, and rigid bodies. Prereqs., CVEN 2121 and APPM 2360. Same as MCEN 3043.

**CVEN 3161-3. Mechanics of Materials 1.** Addresses concepts of stress and strain; material properties, axial loading, torsion, simple bending, and transverse shear; analysis of stress and strain; and deflections of beams. Includes selected experimental and computational laboratories. Prereq., CVEN 2121. Coreq., APPM 2360.

**CVEN 4161-3. Mechanics of Materials 2.** Focuses on concepts of triaxial stress and strain, equilibrium, kinematic relations, basic constitutive relations of engineering materials, strain energy, failure theories, thin and thick-walled cylinders, symmetric/nonsymmetric bending, torsion of thin-walled members, combined loading, buckling of columns, and elastic stability. Includes selected experimental and computational laboratories. Prereq., CVEN 3161.

**CVEN 4511-3. Introduction to Finite Element Analysis.** Systematic formulation of finite element approximation and isoparametric interpolation (weighted residual and energy methods, triangular and quadrilateral elements). Includes computation applications to the solution of one- and two-dimensional stress-deformation problems, steady and transient heat conduction, and viscous flow. Prereqs., CVEN 3161, 3525, and APPM 2360. Same as CVEN 5511.

**CVEN 5111-3. Structural Dynamics.** Introduces dynamic response of linear elastic single and multiple degree of freedom systems. Includes time and frequency domain analysis. Also analyzes building structures. Prereq., instructor consent.

**CVEN 5131-3. Continuum Mechanics and Elasticity.** Provides foundation for advanced study of structural and material behavior and continuum theories in mechanics. Topics include Cartesian tensors, elements of continuum mechanics, constitutive laws for elastic solids, energy principles, methods of potentials, formulations of 2D and 3D elastostatic problems, and general analytical and numerical solutions.

**CVEN 5161-3. Advanced Mechanics of Materials I.** Covers 3-D stress and strain, failure theories, torsion of open and noncircular sections, thick-wall pressure vessels, non-symmetric bending, shell in thin-walled sections, stability of frames and beam-column behavior.

**CVEN 5511-3. Introduction to Finite Element Analysis.** Prereq., graduate standing. Same as CVEN 4511.

**CVEN 5831-3. Special Topics.**

**CVEN 6161-3. Advanced Mechanics of Materials 2.** Fundamentals of continuum mechanics, finite deformations, Lagrangian finite strains, Cauchy and Piola Kirchoff stress tensors, plasticity and thermo-elasticity, elements of damage mechanics, elements of fracture mechanics, rheological and viscoelastic theories, and modern experimental techniques. Recommended prereq., CVEN 5161.

**CVEN 7111-3. Advanced Structural Dynamics.** Includes general vibrations of civil engineering structures and their response to various types of time-dependent loads. Prereq., CVEN 5111.

**CVEN 7141-3. Plates and Shells.** Teaches mathematical theories of plate and shell structures and their applications. Involves numerical finite element solutions of plates and shells of various shapes under static and dynamic loadings. Prereq., CVEN 5121 or 7131.

**CVEN 7161-3. Fracture Mechanics.** Three-part course. The first covers fundamentals through rigorous mathematical formulations of linear and nonlinear elastic fracture mechanics. The second focuses on materials: theoretical strength, metals, granular materials, polymers, and steel. The third covers numerical (finite element) methods in fracture mechanics. Heavy emphasis is placed on project and independent work. Prereq., CVEN 5121.

**CVEN 7511-3. Computational Mechanics of Solids and Structures.** Looks at finite element methodology for geometric and material nonlinearities. Involves incremental formulations and iterative solution strategies for truly finite increments and quasistatic and dynamic applications to large deformation and inelastic problems. Prereqs., CVEN 5511 or 6525.

## Surveying and Transportation

**CVEN 2012-3. Introduction to Geomatics.** Observes, analyzes, and presents basic linear, angular, area, and volume field measurements common to civil engineering endeavors with application of GPS and GIS technology. Prereq., APPM 1350 or equivalent.

**CVEN 3022-3. Construction Surveying.** Studies construction and highway surveying, horizontal and vertical curves, earthwork, and analysis of data. Prereq., CVEN 2012.

**CVEN 3032-3. Photogrammetry.** Familiarizes students with characteristics of aerial photographs. Measures and interprets aerial photos for planimetric, topographic, hydrological, soil, and land use surveys. Analyzes and presents field measurements over extensive reaches. Prereq., instructor consent.

**CVEN 3602-3. Transportation Systems.** Introduces technology, operating characteristics, and relative merits of highway, airway, waterway, railroad, pipeline, and conveyor transportation systems. Focuses on evaluation of urban transportation systems and recent transportation innovations.

**CVEN 4822-3. Geographical Information Systems for Civil and Environmental Systems.** Theory and use of geographical information systems in civil engineering, environmental studies, natural resources, and other related disciplines. Topics include spatial data models, data capture, global positioning system, database linkage, use in design, analysis and implementation.

Laboratory work includes applications of ARC-VIEW and ARC-GIS software. Prereq., CVEN 2012 or instructor consent. Same as CVEN 5822.

**CVEN 5822-3. Geographical Information Systems for Civil and Environmental Systems.** Same as CVEN 4822.

## Fluid Mechanics and Water Resources

**CVEN 3313-3. Theoretical Fluid Mechanics.** Basic principles of fluid mechanics. Covers fluid properties, hydrostatics, fluid flow concepts, including continuity, energy, momentum, boundary-layer theory, and flow in closed conduits. Prereq., CVEN 2121.

**CVEN 3323-3. Hydraulic Engineering.** Reviews basic fluid mechanics, incompressible flow in conduits, pipe system analysis and design, and dimensional analysis and similitude including design aspects, open channel flow, flow measurement, analysis and design of hydraulic machinery, and water resource engineering. Prereq., CVEN 3313.

**CVEN 4323-3. Water Resource Engineering Design.** Design of urban water supply, wastewater, and supply stormwater management system, with demand management as an option. Exploration of the feasibility of recycling and reuse of treated wastewater and stormwater. Prereqs., CVEN 3227 and 4147. Same as CVEN 5423.

**CVEN 4333-3. Engineering Hydrology.** Studies engineering applications of principles of hydrology, including hydrologic cycle, rainfall and runoff, groundwater, storm frequency and duration studies, stream hydrography, flood frequency, and flood routing. Prereqs., CVEN 3227 and 3323.

**CVEN 4343-3. Open Channel Hydraulics.** Studies flow in open channels, natural and constructed. Topics include application of energy equation and momentum relationships, tractive force on erodible boundaries, water surface profiles theory and calculations, and design of transitions. Prereq., CVEN 3313.

**CVEN 4353-3. Groundwater Engineering.** Studies the occurrence, movement, extraction for use, and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems. Prereq., CVEN 3313.

**CVEN 5313-3. Environmental Fluid Mechanics.** Analysis of viscous incompressible flows, with first-principle solutions for environmental fluid flows in oceans, rivers, lakes and the atmosphere. Topics include the Navier-Stokes equations, kinematics, vorticity dynamics, geophysical fluid dynamics, and density stratification. Prereqs., APPM 2350, 2360, CVEN 3313, or equivalents.

**CVEN 5323-3. Applied Stream Ecology.** Emphasizes the integration of hydrologic, chemical, and biological processes in controlling stream ecosystems at several spatial scales. Students apply ecosystem concepts to current environmental and water quality problems and learn field methods in field trips and a team project. Prereqs., general chemistry, physics. Recommended prereqs., hydrology, ecology, or environmental chemistry.

**CVEN 5333-3. Hydrology.** Prereq., instructor consent.

**CVEN 5343-3. Transport and Dispersion in Surface Water.** Studies transport and dispersion of introduced contaminants in turbulent surface water flows. Emphasizes developing a physical understanding of fluid processes responsible for turbulent dispersion. Includes analytical development, numerical modeling, and experimental approaches to the problem.

**CVEN 5353-3. Groundwater Hydrology.** Studies the occurrence, movement, extraction for use, and quantity and quality aspects of groundwater. Introduces and uses basic concepts to solve engineering and geohydrologic problems. Prereqs., CVEN 3313 and APPM 2360, or equivalent, or instructor consent.

**CVEN 5363-3. Modeling of Hydrologic Systems.** Introduces students to the techniques used in modeling various processes in the hydrologic cycle. Helps students develop numeric models and computer programs for use in conjunction with existing simulation modes such as HEC1 and HEC2 in a design project. Prereqs., CVEN 3313 and instructor consent.

**CVEN 5373-3. Water Law, Policy, and Institutions.** Discusses contemporary issues in water management based on legal doctrine. Identifies legal issues in water resources problems and discusses in close relationship with technical, economic, and political considerations. Prereq., senior or graduate standing.

**CVEN 5383-3. Applied Groundwater Modeling.** Studies mathematical and numerical techniques needed to develop models to solve problems in water flow and chemical transport in the saturated and unsaturated zones of aquifers. Not only emphasizes the learning of modeling techniques from fundamentals, but also the application of models and modeling methods to solve problems in groundwater engineering, geo-environmental engineering, hazardous waste management, aquifer remediation design, and aquifer clean-up. Prereqs., CVEN 5353, 5454, or equivalent, and APPM 2360 or equivalent.

**CVEN 5393-3. Water Resources Development and Management.** Explores the principles governing water resources planning and development. Emphasizes the sciences of water (physical, engineering, chemical, biological, and social) and their interrelationships. Prereq., senior or graduate standing. Same as ECON 6555.

**CVEN 5423-3. Water Resource Engineering Design.** Same as CVEN 4323.

**CVEN 6323-3. Urban Stormwater Infrastructure Systems.** Evaluation and design of more sustainable urban stormwater infrastructure systems including street inlets, on-line and off-line surface storage and infiltration systems. Integrated design for major, minor, and micro storms to provide flood control and drainage as well as control of pollution from stormwater runoff. Simulation and optimization models will be used.

**CVEN 6333-3. Introduction to Multi-Scale Variability and Scaling in Hydrology.** Provides a foundational physical understanding of channel networks, runoff, precipitation, and evapotranspiration at multiple spatial scales of drainage basins using modern analytical concepts for understanding non-linear phenomena, e.g., fractals, multifractals, statistical scaling, criticality, and renormalization. Prereq., CVEN 3313, 5333, 5454, and an upper-division course in probability, or equivalents.

**CVEN 6383-3. Flow and Transport through Porous Media.** Studies basic physics of flow and transport of water, air, and other fluid mixtures through a porous medium. Course topics are relevant to applications in contaminant hydrology, contaminant transport in aquifers, hazardous waste management, geohydrology, soil physics, and geoenvironmental engineering.

**CVEN 6393-1. Hydrologic Sciences and Water Resources Engineering Seminar.** Provides a broad introduction to a variety of research topics from hydrologic sciences and water resources engineering. Offered as a one-hour weekly seminar by the departmental water faculty, graduate students, and external speakers. Restricted to graduate students in engineering.

## Environmental

**CVEN 3414-3. Fundamentals of Environmental Engineering.** Introduces environmental protection legislation and various water, air, and hazardous waste problems. Stresses basic geochemical, ecological, mass conservation, and environmental chemistry concepts in relation to solving environmental engineering problems. Prereqs., CHEN 1211 and APPM 1360.

**CVEN 3424-3. Water and Wastewater Treatment.** Introduces design and operation of facilities for treatment of municipal water supplies and wastewater. Provides an engineering application of physical, chemical, and biological unit processes and operations for removal of impurities and pollutants. Involves an integrated design of whole treatment systems combining process elements. Prereq., CVEN 3414.

**CVEN 3434-3. Introduction to Applied Ecology.** Emphasizes the integration of physical, chemical, and biological processes in controlling terrestrial and aquatic ecosystems. Ecosystem concepts are applied to current environmental and water quality problems. Includes field trips and a group project. Prereq., CHEM 1111 or CHEN 1211 and 1221. Restricted to junior/senior CVEN, EVEN or AREN majors. Same as ENVS 3434.

**CVEN 4404-3. Water Chemistry.** Introduces chemical fundamentals of inorganic aqueous compounds and contaminants in lecture and laboratory. Lecture topics include thermodynamics and kinetics of acids and base reactions, carbonate chemistry, air-water exchange, precipitation, dissolution, complexation, oxidation-reduction, and sorption. Prereqs., CHEN 1211 and CVEN 3414, or CHEM 1111 and 1131 for non-engineers. Same as CVEN 5404. Formerly CVEN 3454.

**CVEN 4414-1. Water Chemistry Laboratory.** Reinforces chemical fundamentals of inorganic aqueous compounds and contaminants from CVEN 4404

Water Chemistry in laboratory experiments and reports. Topics include acids and bases, carbonate chemistry (alkalinity), and other water chemistry characteristics (hardness, dissolved oxygen); precipitation, complexation, and oxidation-reduction reactions; and laboratory techniques and reporting. Prereqs., CHEN 1211 and CVEN 3414 or CHEM 1111 and 1131 for non-engineers. Coreq., CVEN 4404.

**CVEN 4424-3. Environmental Organic Chemistry.** Examines the fundamental physical and chemical transformations affecting the fate and transport of organic contaminants in natural and treated waters. Emphasizes solubility, vapor pressure, air-water exchange, sorption, abiotic and biotic reactions, and photodegradation. Same as CVEN 5424.

**CVEN 4434-3. Environmental Engineering Design.** Examines the design of facilities for the treatment of municipal water and wastewater, hazardous industrial waste, contaminated environmental sites, and sustainable sanitation in developing countries. Economic, societal, and site specific criteria impacting designs are emphasized. Prereq., CVEN 3414. Restricted to seniors. Same as CVEN 5434.

**CVEN 4474-3. Hazardous and Industrial Waste Management.** Evaluates processes used for treatment of wastes requiring special handling and disposal: toxic organic chemicals, heavy metals, and acidic, caustic, and radioactive waste material. Discusses techniques for destruction, immobilization, and resource recovery and assessment of environmental impact of treatment process end products. Prereq., CVEN 3414. Same as CVEN 5474.

**CVEN 4484-3. Introduction to Environmental Microbiology.** Surveys microbiology topics germane to modern civil and environmental engineering. Provides fundamentals needed to understand microbial processes and ecology in engineered and natural systems and reviews applications emphasizing the interface between molecular biology and classical civil engineering. Prereq., CHEM 1211, CHEN 1221, APPM 1350, 1360, and 2350.

**CVEN 4834 (1-3). Special Topics.** Prereq., instructor consent. May be repeated up to 6 total credit hours provided topics are different.

**CVEN 5404-3. Water Chemistry.** Same as CVEN 4404.

**CVEN 5414-3. Water Chemistry Laboratory.** Uses experimental and analytical laboratory techniques to develop a better understanding of the concepts of aquatic chemistry and to investigate water chemistry in treated and natural water systems. Techniques include titration, spectrophotometry, gas chromatography, other advanced instrumentation, sampling, portable analyses, and basic statistics and experimental design. Course focuses on water chemistry of Boulder Creek and other local waters. Prereq., CVEN 5404 or GEOL 5280. Coreq., CVEN 5424.

**CVEN 5424-3. Environmental Organic Chemistry.** Same as CVEN 4424.

**CVEN 5434-3. Environmental Engineering Design.** Prereq., instructor consent. Recommended prereq., CVEN 5524, 5534, or 5474. Same as CVEN 4434.

**CVEN 5454-3. Quantitative Methods.** Introduces the use of digital simulation in the analysis of water resources and environmental systems. Develops computer programs for the simulation of reservoir operations, watershed runoff, stream quality, and lake quality, and uses existing software to analyze more complex problems. Prereq., instructor consent.

**CVEN 5474-3. Hazardous and Industrial Waste Management.** Same as CVEN 4474.

**CVEN 5484-3. Introduction to Environmental Microbiology.** Same as CVEN 4484.

**CVEN 5494-3. Surface Water Quality Modeling.** Examines the relationships among air, water, and land pollution, water quality, and beneficial uses. Using models, develops the ability to quantify and predict the impacts of pollutants in the aquatic environment, and to develop approaches to minimize unfavorable water quality conditions. Prereq., instructor consent.

**CVEN 5514-3. Bioremediation.** Advanced study on biological processes used to treat toxic organic and inorganic compounds contained in contaminated water, air, and soil; design and evaluation of in situ toxic compound biotransformation; fundamentals of phytoremediation; critical reviews of current literature on bioremediation. Prereq., CVEN 4484 or 5484 or instructor consent. Recommended prereq., CVEN 5424.

**CVEN 5524-3. Drinking Water Treatment.** Provides advanced study on theory-of-treatment processes, including design and operation of municipal water supplies. Prereq., graduate standing or instructor consent.

**CVEN 5534-3. Wastewater Treatment.** Offers an advanced analysis of wastewater treatment systems; design and operation of treatment process reactors; factors affecting performance of facilities used for physical separation; and chemical and biological conversion of wastewater compounds, including nitrogen and phosphorus. Prereq., graduate standing or instructor consent.

**CVEN 5544-3. Solid Waste Management and Resource Recovery.** Covers the scope of the nonhazardous solid waste problem and regulations that drive its management; discussions of nonengineering factors that impact waste management and recycling; design of incinerators, composting facilities, and landfills used to treat and dispose of solid waste. Recommended prereq., CVEN 3414.

#### **CVEN 5834 (1-3). Special Topics.**

**CVEN 6404-3. Advanced Aquatic Chemistry.** Examines aquatic equilibria, corrosion, colloid and polymer chemistry, behavior of natural organic matter in engineered systems, and application of personal computers to model aquatic equilibria. Requires a term project. Prereq., CVEN 5402. Offered in the spring every other year.

**CVEN 6414-3. Aquatic Surfaces and Particles.** Examines the role of surfaces and particles in the fate and transport of contaminants in the aquatic environment. Emphasizes modeling of absorption, dissolution, precipitation, surface-catalyzed reactions, and coagulation and filtration kinetics. Prereqs., CVEN 5404 or GEOL 5280.

#### **CVEN 6834 (1-3). Special Topics.**

## Structures

**CVEN 3525-3. Structural Analysis.** Studies structural analysis of statically determinate and indeterminate systems, deflections, energy methods, and force method. Prereq., CVEN 3161.

**CVEN 4525-3. Analysis of Framed Structures.** Studies matrix formulation of principles of structural analysis and development of direct stiffness and flexibility methods for analysis of frame and truss structures. Topics include support settlements, thermal loads, and energy formulations of force-displacement relationships. Prereq., CVEN 3525. Same as CVEN 5525.

**CVEN 4545-3. Steel Design.** Applies basic principles to design of steel structures; design of tension members, columns, beams, beam-columns, and connections; continuous beams and frames; and elastic and plastic design methods. One of three capstone courses available to civil engineering majors. Prereq., CVEN 3525.

**CVEN 4555-3. Reinforced Concrete Design.** Focuses on applications to the design of reinforced concrete structures, including design of beams, columns, and slabs; prestressed concrete; footings; continuous beams and frames; buildings; and bridges. One of three capstone courses available to civil engineering majors. Prereq., CVEN 3525.

**CVEN 4565-2. Timber Design.** Applies design methods to beams, columns, trusses, and connections using timber and glued, laminated members. Prereq. or coreq., CVEN 3525.

**CVEN 5525-3. Analysis of Framed Structures.** Same as CVEN 4525.

**CVEN 5555-3. Structural Reliability.** Explores principles and methods of structural reliability, and formulates bases for design to insure adequate safety and performance of elements and structural systems. Prereq., CVEN 3535, 4525, or instructor consent.

**CVEN 5565-3. Life-Cycle Engineering of Civil Infrastructure Systems.** Philosophical and analytical issues for lifetime design and operation of civil systems. Optimization tradeoffs of construction, management, and sustainability. Utility of operation and service, including present-value economic analysis. Decision-making alternatives of safety and performance, including hazards consideration. Recommended prereqs., CVEN 3535 and CVEN 3227 or equivalents.

**CVEN 5575-3. Advanced Topics in Steel Design.** Covers steel structure design and analysis. Includes plate girders, moment connections for beams,

design of multistory frames, and other topics determined by class interest. Prereq., CVEN 4545 or equivalent.

**CVEN 5585-3. Advanced Topics in Reinforced Concrete Design.** Covers design and analysis topics for prestressed concrete and/or reinforced concrete structures. Includes review of the current ACI design code, slabs, prestressed concrete, seismic design, folded plates and shells, finite element analysis, and other topics determined by class interest. Prereq., CVEN 4555 or equivalent.

**CVEN 5835-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

**CVEN 6525-3. Finite Element Analysis of Structures.** Reviews membrane, plate, and shell elements; displacement and mixed models; Kirchoff and Mindlin bending formulations; and reduced integration techniques. Introduces nonlinear problems. Provides application to buckling and vibration of structures. Prereq., CVEN 4525 and instructor consent, or CVEN 5511.

**CVEN 6595-3. Earthquake Engineering.** Analyzes and designs structures for earthquake loadings. Gives attention to earthquake ground motions, attenuation laws, and seismic hazard analysis. Also involves numerical methods for time-domain and frequency-domain analysis, response of linear and nonlinear structures, elastic and inelastic response spectra, construction of design spectra, soil-structure interaction analysis, and seismic design methods and building code requirements. Prereq., CVEN 5111 or equivalent.

**CVEN 7545-3. Structural Optimization.** Studies fundamental propositions for the design of skeletal structures, automatic design of optimal structures, life-cycle cost design of deteriorating structures, problem-oriented computer languages, and linear and nonlinear programming methods for structural design. Prereq., CVEN 4525 or equivalent.

**CVEN 7565-3. Inelastic Theory of Structures.** Examines inelastic behavior of materials, including calculation of ultimate capacity of perfectly plastic structures by use of upper- and lower-bound theorems. Looks at theories of inelastic action as applied to structural design in steel and concrete and elements of theory of plasticity with applications in ultimate analysis of plates, shells, and continuous bodies. Prereq., CVEN 3505.

**CVEN 7595-3. Earthquake Engineering.** Analysis and design of structures for earthquake loadings. Earthquake ground motions, attenuation laws, and seismic hazard analysis. Numerical methods for time-domain and frequency-domain analysis response of linear and nonlinear structures. Elastic and inelastic response spectra, and construction of design spectra. Soil-structure interaction analysis. Seismic design methods and building code requirements. Prereq., CVEN 5111 or equivalent.

## Construction

**CVEN 3246-3. Introduction to Construction.** Broad view of concerns, activities, and objectives of people involved in construction: the owner, architect/engineer, contractor, labor, and inspector. Interactive gaming situation relates these people to the construction contract, plans/specifications, estimates/bids, scheduling, law, and financial management. Prereq., junior level standing or instructor consent.

**CVEN 3256-3. Construction Equipment and Methods.** Integrated study of engineering economics, construction equipment and construction methods. Topics include the time value of money, equipment costs, equipment productivity, equipment selection and construction engineering design including concrete formwork, falsework, and temporary construction. Recommended prereq., CVEN 3246.

**CVEN 4266-3. Project Administration.** Comprehensively studies the administrative activities needed to manage modern construction projects. Emphasizes document control, shop drawing management, extra work order monitoring, and RFI procedures. Uses state-of-the-art construction contract management software. Develops negotiation and presentation skills through in-class exercises. Prereqs., CVEN 3246 and AREN 3406. Same as CVEN 5266.

**CVEN 5206-3. Design Development.** Investigates the interrelationship between design decisions and building costs, and the impact of each major building system and building trade on project budgets and schedules. Gives students the opportunity to prepare technical, marketing, and financial pack-

ages for investors as well as regulatory and financial institutions. Culminates with detailed presentations of student-developed project prospectuses. Prereqs., AREN 3406, 4416, CVEN 3246 and 5236, as well as instructor consent.

**CVEN 5216-3. Applied Construction Financial Management.** Interpreting commonly used financial reports in the construction engineering industry sector will be taught. Skills developed in this course will better prepare students to become competent consumers of financial information utilizing the same to influence future results the construction business. Models for financing public and private sector projects will also be explored.

**CVEN 5226-3. Quality and Safety.** Comprehensively studies quality and safety for construction projects. Extensively reviews OSHA regulations and industry safety programs and the legal and economic ramifications of a safe construction site. Thoroughly reviews quality control and quality assurance topics, including organizations, measurement, and procedures. Briefly reviews ISO 9000 impact on construction projects.

**CVEN 5236-3. Construction Planning and Scheduling.** Comprehensively studies construction management including the contractor's role in preconstruction and construction activities; and the particular application of CPM techniques to the planning, scheduling, and control of a construction project. Applies the techniques of the course to a term project.

**CVEN 5246-3. Legal Aspects of Construction.** Applies law in engineering practice; contracts, construction contract documents, construction specification writing, agency, partnership, and property; types of construction contracts; and legal responsibilities and ethical requirements of the professional engineer. Prereq., graduate standing or instructor consent. Same as CVEN 4087.

**CVEN 5256-3. Strategic Issues in Construction.** Studies and analyzes construction top- and upper- middle management responsibilities, particularly relating to union craft labor, on- and off-site production and workmanship, construction financing, total quality management, value engineering, disputes and claims, and engineering technology. Stresses investigations to improve construction management efficiency. Prereq., graduate standing or instructor consent.

**CVEN 5266-3. Project Administration.** Prereqs., CVEN 3246 and AREN 3406. Same as CVEN 4266.

**CVEN 5276-3. Engineering Risk and Decision Analysis.** Acquaints students with the fundamental principles and techniques of risk and decision analysis. Oriented toward project-level decisions in which risk or uncertainty plays a central role. Introduces students to Monte Carlo analyses, influence diagrams, and various types of multicriteria decision analyses. Culminates in a larger term project. Recommended prereq., CVEN 3227.

**CVEN 5286-3. Design Construction Operations.** Considers topics associated with the effective and efficient design of construction operations. Topics include construction productivity measurement systems, methods improvement, and short interval scheduling. Introduces and applies several computer-based simulation techniques to real-world problems. Concludes with a discussion of quality control and quality assurance emphasizing statistical QC procedures. Prereq., graduate standing or instructor consent.

**CVEN 5296-3. Construction Engineering 2.** Provides an advanced study of the application and analysis of construction equipment and methods. Topics include drilling, blasting, tunneling, dewatering foundations, earthmoving, and safety. Applicable to both building and public works construction. Prereq., graduate standing or instructor consent.

**CVEN 5306-3. Building Reuse and Retrofit.** Explores the issue that the building industry in the 21st century will be dominated by reuse and retrofit of existing structures. Analyzes the financial, marketing, design, and construction aspects of retrofitting U.S. building stocks such as the Empire State Building and the Seattle Kingdome. Develops and evaluates appropriate reuse and retrofit schemes through student teamwork. Prereqs., AREN 3406 and CVEN 3246. Same as AREN 4417.

**CVEN 5316-3. Applied Construction Engineering Financial Management.** Exploration of common financial techniques utilized to manage construction engineering organizations. Students will develop knowledge required to interpret common financial reports, monitor business performance and the ability to influence and forecast future results. Models will also be explored

for financing public and private projects. Prereq., CVEN 3246. Restricted to graduate students or instructor consent.

**CVEN 5326-3. Construction Project Controls.** Examines tools and techniques employed to control design processes and construction operations. Students apply advanced scheduling and estimating techniques, culminating in the concept of earned value project management. Introduces high tech project control tools. Recommended prereqs., AREN 4416 and 4466.

**CVEN 5336-3. Construction Project Delivery.** Analysis of construction project delivery, including traditional, design-build, construction management, and multiple prime contractors. Related contractual issues and associated financing are also covered. Focuses on the owner's role in the construction process. Recommended prereqs., AREN 4416 and CVEN 4087.

**CVEN 5836 (1-3). Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. May be repeated up to 9 total credit hours. Prereq., Instructor consent.

**CVEN 7206-1. CEM PhD Seminar.** Examines emerging research in construction engineering and management. Students will consider and comment on research methods and designs based on their own work and that of CU faculty and other leading researchers. Aims to make CEM PhD students better researchers and evaluators of research methods and processes.

## Miscellaneous

**CVEN 1317-1. Introduction to Civil and Environmental Engineering.** Surveys the broad subject of civil and environmental engineering and professional practice. Includes the subdisciplines of structures, water resources, geotechnics, transportation, environment, and construction. Discusses professional ethics, important skills for engineers, and the engineering design process as it fulfills multiple objectives.

**CVEN 3227-3. Probability, Statistics and Decision.** Introduces uncertainty based analysis concepts and applications in the planning and design of civil engineering systems emphasizing probabilistic, statistics, and design concepts and methods. Restricted to juniors/seniors.

**CVEN 4087-3. Engineering Contracts.** Applies law in engineering practice: contracts, construction contract documents, construction specification writing, agency, partnership, and property; types of construction contract; and legal responsibilities and ethical requirements of the professional engineer. Prereq., senior standing in civil or architectural engineering or instructor consent.

**CVEN 4147-3. Civil Engineering Systems.** Theory and application of the principles of engineering economics, and classical and metaheuristic optimization techniques for evaluating problems in civil and environmental engineering. Prereq., senior standing. Same as CVEN 5147.

**CVEN 4537-3. Numerical Methods in Civil Engineering.** Introduces the use of numerical methods in the solution of civil engineering problems, emphasizing obtaining solutions with high-speed electronic computers. Applies methods to all types of civil engineering problems. Prereq., senior standing. Same as CVEN 5537.

**CVEN 4837 (1-3). Special Topics.** Prereqs., GEEN 1300, or CSCI 1700 and GEEN 1017.

**CVEN 5147-3. Civil Engineering Systems.** Same as CVEN 4147.

**CVEN 5537-3. Numerical Methods in Civil Engineering.** Prereq., graduate standing. Same as CVEN 4537.

**CVEN 5837-3. Special Topics for Seniors/Grads.** Supervised study of special topics of interest to students under instructor guidance. Prereq., instructor consent.

## Geotechnical

**CVEN 3698-3. Engineering Geology.** Highlights the role of geology in engineering minerals; rocks; surficial deposits; rocks and soils as engineering materials; distribution of rocks at and below the surface; hydrologic influences; geologic exploration of engineering sites; mapping; and geology of underground excavations, slopes, reservoirs, and dam sites. Includes a field trip.

**CVEN 3708-3. Geotechnical Engineering 1.** Studies basic characteristics of geological materials; soil and rock classifications; physical, mechanical, and hydraulic properties; the effective stress principle; soil and rock improvement; seepage, consolidation; stress distribution; and settlement analysis. Selected experimental and computational laboratories. Prereq., CVEN 3161.

**CVEN 3718-3. Geotechnical Engineering 2.** Discusses shear strength, bearing capacity, lateral earth pressures, slope stability, and underground construction. Analyzes and looks at the design of shallow and deep foundations, retaining walls, tunnels, and other earth and rock structures. Selected experimental and computational laboratories. Prereq., CVEN 3708.

**CVEN 4718-3. Mechanics and Dynamics of Glaciers.** Development of a quantitative physical basis for understanding the functions of snow, ice, and glaciers in the environment, with emphasis on developing an understanding of continuum mechanics and thermodynamics and their application to Earth systems. Prereqs., 3 semesters of calculus, differential equations, thermodynamics, computer programming experience. Recommended prereqs., partial differential equations, linear algebra. Same as CVEN 5718.

**CVEN 4728-3. Foundation Engineering.** Focuses on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles, and drilled piers. Coverage includes bearing capacity, settlement, group effects, and lateral load capacity of the various foundation types. Additional topics include subsurface exploration, construction of deep foundations, and analysis of pile behavior using wave equation and dynamic monitoring methods. Prereqs., CVEN 3718 or instructor consent. Same as CVEN 5728.

**CVEN 4878 (1-3). Independent Study.** Involves an independent, in-depth study, research, or design in a selected area of civil or environmental engineering. Offerings are coordinated with individual faculty. Students should consult the Department of Civil, Environmental, and Architectural Engineering. Numbered CVEN 4840 through CVEN 4878.

**CVEN 5628-3. Seepage and Slopes.** Covers fundamental principles of seepage in soils under both saturated and unsaturated conditions and limit equilibrium solution to slope stability problems. The seepage effects on slope stability are analyzed in detail and both conventional slope stability method and the finite element technique are applied to solving the engineering problems. Prereqs., CVEN 3708 and 3718 or instructor consent.

**CVEN 5678-3. Soil Improvement and Reinforcement.** Provides students with principles and working knowledge of design and construction procedures in soil stabilization, retaining structures, geosynthetics, and soil reinforcement. Prereq., CVEN 3718 or instructor consent.

**CVEN 5688-3. Environmental Geotechnics.** Provides an understanding of the use of geotechnical concepts in the analysis and design of environmental systems. Focus is placed on the evaluation of waste containment facilities. Covers relevant aspects of mining geotechnics and remediation technologies of contaminated sites.

**CVEN 5708-3. Soil Mechanics.** Offers an advanced course in principles of soil mechanics. Coverage includes topics in continuum mechanics; elasticity, viscoelasticity, and plasticity theories applied to soils; the effective stress principle; consolidation; shear strength; critical state concepts; and constitutive, numerical, and centrifuge modeling. Prereq., CVEN 3718.

**CVEN 5718-3. Mechanics and Dynamics of Glaciers.** Same as CVEN 4718.

**CVEN 5728-3. Foundation Engineering.** Same as CVEN 4728.

**CVEN 5738-3. Applied Geotechnical Analysis.** Studies applications of limiting equilibrium and limit plasticity analysis methods to stability problems in geotechnical engineering, such as slopes, lateral earth pressures on retaining structures, and bearing capacities of foundations. Also includes elastic and consolidation analysis of deformations in soil structures. Prereq., CVEN 5708 or instructor consent.

**CVEN 5748-3. Design of Earth Structures.** Covers theory, design, and construction of earth embankments and waste facilities, including isolation systems. Uses published data, field exploration, and laboratory tests on soils and rock in investigating foundations and construction materials. Involves principles of compaction and settlement, permeability analysis, landslide recognition and control, use of composite clay, and liner systems. Prereq., CVEN 5708 or instructor consent.

**CVEN 5758-3. Flow Processes in Soils.** Examines fundamental principles of flow through porous media and related engineering problems. Topics include the saturated seepage theory and flow nets; the unsaturated flow theory; suction-saturation and saturation-hydraulic conductivity relationships; nonlinear finite strain consolidation and desiccation theory; laboratory and field testing methods for determining material characteristics; and numerical models for flow-related engineering problems. Prereq., CVEN 3718 or instructor consent.

**CVEN 5768-3. Introduction to Rock Mechanics.** Nature of rocks and rock masses; index properties rock and rock mass classifications, deformability and strength, rock hydraulics, mechanical behavior of planes of weakness in rock. Laboratory and situ testing. Prereqs., CVEN 3708 and 3718, or instructor consent.

**CVEN 5778-3. Applied Rock Mechanics.** Studies in situ stresses in rocks and their measurement with application of rock mechanics to rock slope engineering, engineering for underground openings and foundation engineering, and numerical methods in rock mechanics. Prereq., CVEN 5768.

**CVEN 5788-3. Computational Mechanics for Geomaterials.** Covers constitutive modeling for geomaterials, finite element implementation of constitutive models, and coupled solid-fluid mechanical governing equations for inelastic porous media. Considers transient and steady state conditions. Analyzes geotechnical, geological, structural, and other related modern engineering problems. Uses general purpose finite element software program for implementation and analysis. Prereqs., CVEN 5511 or ASEN 5007, and CVEN 5131 or MCEN 5023 or instructor consent.

**CVEN 5798-3. Dynamics of Soils and Foundations.** Examines the behavior of soils and foundations subjected to self-excited vibrations and earthquake ground motions. Looks at principles of wave propagation in geologic media; in situ and laboratory determination of engineering properties for dynamic analysis; and applications of these principles and properties in design and analysis of foundations and earth structures subjected to dynamic loading. Prereq., CVEN 5708 or instructor consent.

**CVEN 7718-3. Engineering Properties of Soils.** Considers constitutive behavior of cohesive and cohesionless soils including stress-strain, strength, pore water pressure, and volume change behavior under drained and undrained loading conditions. Also includes linear and nonlinear analysis techniques and determination of constitutive properties in the laboratory. Prereq., CVEN 5708 or instructor consent.

**CVEN 7788-3. Soil Behavior.** Topics include soil mineralogy, formation of soils through sedimentary processes and weathering, determination of soil composition, soil water, colloidal phenomena in soils, fabric property relationships, analysis of mechanical behavior including compressibility, strength and deformation, and conduction phenomena in terms of physicochemical principles. Involves applications for stabilization and improvement of soils, and disposal of waste materials. Prereq., CVEN 3718 or instructor consent.

## Special Topics

**CVEN 4039-1. Senior Seminar.** Lecture series by outstanding university faculty members in the humanities and eminent professional engineers in special fields of practice, particularly on subjects with new developments. The EIT examination is required for successful completion of this course. Prereq., senior standing.

**CVEN 4839 (3-6). Special Topics for Seniors.** Offers a supervised study of special topics, under instructor guidance. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**CVEN 5849 (1-6). Independent Study.** Available only through approval of graduate advisor. Subject arranged to fit needs of student. May be repeated up to 6 total credit hours.

## Computer Science

### General Computer Science

**CSCI 1000-1. Computer Science as a Field of Work and Study.** Introduces curriculum, learning techniques, time management and career opportunities

in Computer Science. Includes presentations from alumni and others with relevant educational and professional experience.

**CSCI 1200-4. Introduction to Computing.** Presents an introduction to various uses of computers, including text processing, communication, spreadsheets, and database systems as well as an introduction to computer programming.

**CSCI 1220-4. Virtual Worlds: An Introduction to Computer Science.** Introduces the fundamental principles of computer science using an on-line virtual world called Second Life as the “laboratory” for the course. Students will learn how to program by creating objects of interest in Second Life. In-class and in-world discussions and readings will introduce the student to important ideas and concepts that shape the field of computer science. Same as ATLS 1220.

**CSCI 1240-3. The Computational World.** Introduces and explores the “computational style of thinking” and its influence in science, mathematics, engineering and the arts. The course does not focus on the nuts and bolts of any particular programming language, but rather on the way in which computing has affected human culture and thought in the past half century. Same as ATLS 1240.

**CSCI 1300-4. Computer Science 1: Programming.** Teaches techniques for writing computer programs in higher level programming languages to solve problems of interest in a range of application domains.

**CSCI 2270-4. Computer Science 2: Data Structures.** Studies data abstractions (e.g., stacks, queues, lists, trees) and their representation techniques (e.g., linking, arrays). Introduces concepts used in algorithm design and analysis including criteria for selecting data structures to fit their applications. Prereqs., CSCI 1300, and one of APM 1350 or Math 1300.

**CSCI 2400-4. Computer Systems.** Covers how programs are represented and executed by modern computers, including low-level machine representations of programs and data, an understanding of how computer components influence performance and memory hierarchy. Prereq., CSCI 2270.

**CSCI 2830 (1-3). Special Topics in Computer Science.** Covers topics of interest in computer science at the sophomore level. Content varies from semester to semester.

**CSCI 2900 (1-3). Lower Division, Undergraduate Level Independent Study.** Offers selected topics at the elementary level for students with little or no previous computing experience.

**CSCI 4000-3. Entrepreneurship in Computing.** Examines the development of new venture creation from the entrepreneur’s perspective. Provides an understanding of the entire process including opportunity identification, feasibility study, fundraising, organization, team creation, and exit strategies through case studies, oral and written presentations, and outside speakers. Taught by an experienced entrepreneur. Prereq., CSCI 2270. Restricted to juniors/seniors.

**CSCI 4810-1. Seminar in Computational Biology and Health Informatics.** Provides an overview of current research topics in computational biology and health informatics, with a focus on research conducted on campus. Each week students will attend an on-campus seminar or a presentation by an on-campus research group. Prepares students to participate in a research project. Prereqs., CSCI 4312 or 4314 or 4317.

**CSCI 4830-3. Special Topics in Computer Science.** Covers topics of interest in computer science at the senior undergraduate level. Content varies from semester to semester.

**CSCI 4900 (1-6). Upper Division, Undergraduate Level Independent Study.** Provides opportunities for independent study at the upper-division undergraduate level. Students work on a small research problem or tutor lower-division computer science students. Prereq., CSCI 1200 or 1300.

**CSCI 4950 (2-4). Senior Thesis.** Provides an opportunity for senior computer science majors to conduct exploratory research in computer science. Prereqs., successful completion of a minimum of 36 credit hours of CSCI Foundation, Track Foundation, Track Core, and CSCI electives, and WRTG 3030. Restricted to seniors. May be repeated up to 8 total credit hours.

**CSCI 5900 (1-6). Master’s Level Independent Study.** Provides opportunities for independent study at the master’s level.

**CSCI 6000-1. Introduction to the Computer Science PhD Program.** Instructs new PhD students in Computer Science how to obtain a PhD and how to become an effective member of the computer science research community. Makes students aware of formal requirements, educational objectives, and research themes. Provides evaluative criteria and guidelines for all objectives to be achieved. Restricted to new PhD students in Computer Science.

**CSCI 6800-3. Master of Engineering Project.** Students seeking the master of engineering degree must complete a creative investigation project, including a written report, supervised by a member of the graduate faculty. Prereq., completion of 21 hours towards the ME degree.

**CSCI 6940 (1-3). Master’s Degree Candidacy.** For students who need to be registered for the purpose of taking the master’s comprehensive exam and who are not otherwise registered. Credit does not count toward degree requirements. Graded on a pass/fail basis.

**CSCI 6950 (4-6). Master’s Thesis.**

**CSCI 7000 (1-4). Current Topics in Computer Science.** Covers research topics of current interest in computer science that do not fall into a standard sub-area. May be repeated up to 8 total credit hours. Prereq., instructor consent.

**CSCI 7900 (1-6). Doctoral Level Independent Study.** For doctoral students.

**CSCI 8990 (1-10). Doctoral Dissertation.** Investigates some specialized field of computer science. Approved and supervised by faculty members.

## Parallel Processing

**CSCI 5551-3. Parallel Processing.** Examines a range of topics involved in using parallel operations to improve computational performance. Discusses parallel architectures, parallel algorithms and parallel programming languages. Architectures covered include vector computers, multiprocessors, network computers, and data flow machines. Prereq., background in computer organization, introduction to programming languages, elementary numerical analysis, ECEN 4593 and CSCI 3656, or instructor consent. Same as ECEN 5553.

**CSCI 7111-3. Topics in Parallel Processing.** Content varies, but subjects include parallel machine architecture, parallel algorithms, languages for parallel computation, and applications. Takes subject matter from current research. Prereq., instructor consent.

## Artificial Intelligence

**CSCI 3002-3. Digital and Social Systems Foundations.** Introduces practice and research in human computer interaction, design of interactive systems, computer supported cooperative work, computer supported collaborative learning, educational technology, tools that support creativity, user-developed knowledge collections, and gaming.

**CSCI 3112 (1-3). Digital and Social Systems Professional Development.** Supports students in developing professional skills and practices in human computer interaction, design of interactive systems, computer supported cooperative work, computer supported collaborative learning, educational technology, tools that support creativity, user-developed knowledge collections, and gaming. May be repeated up to 10 total credit hours. Same as ATLS 3112.

**CSCI 3202-3. Introduction to Artificial Intelligence.** Surveys artificial intelligence techniques of search, knowledge representation and reasoning, probabilistic inference, machine learning, and natural language processing. Introduces artificial intelligence programming. Prereq., CSCI 2824.

**CSCI 3702. Cognitive Science.** Introduces cognitive science, drawing from psychology, philosophy, artificial intelligence, neuroscience, and linguistics. Studies the linguistic relativity hypothesis, consciousness, categorization, linguistic rules, the mind-body problem, nature versus nurture, conceptual structure and metaphor, logic/problem solving, and judgment. Emphasizes the nature, implications, and limitations of the computational model of mind. Prereqs., two of the following: PSYC 2145, LING 2000, CSCI 1300, and PHIL 2440. Same as LING 3005, PHIL 3310, and PSYC 3005.

**CSCI 4202-3. Artificial Intelligence 2.** Second course in artificial intelligence. Topics may vary, but typically cover neural networks, natural language processing, and artificial life. Prereq., CSCI 3202 or instructor consent.

**CSCI 4312-3. Medical Informatics.** Teaches students essential skills necessary for developing usable assistive and performance support systems, which include consideration of the academic and professional interdisciplinary issues that govern the work. An overview of ongoing and emerging topics in medical informatics will be presented. Prereq., CSCI 2270. Recommended prereq., CSCI 3002. Same as CSCI 5312.

**CSCI 4342-3. Groupware and Workflow Systems.** Supports students in developing professional skills and knowledge concerning the use of computer technologies to support collaborative activities. Also covers the impact of digital collaboration technologies on users, groups, organizations and society. Students will gain practical experience with Business Process Management and the use of Workflow Management Systems. Same as CSCI 5342.

**CSCI 4412-3. Design, Creativity, and New Media.** Explores the design of new media and technologies to support design and creativity. Analyzes design and creativity as human activities of fundamental importance in the networked information culture and economy. Provides theoretical and practical analysis of new media. Instructor consent required. Same as CSCI 5412.

**CSCI 5312-3. Medical Informatics.** Same as CSCI 4312.

**CSCI 5342-3. Groupware and Workflow Systems.** Same as CSCI 4342.

**CSCI 5412-3. Design, Creativity, and New Media.** Same as CSCI 4412.

**CSCI 5582-3. Artificial Intelligence.** Surveys artificial intelligence methods, theories, and applications. Studies the relationship between artificial intelligence and psychology, linguistics, and philosophy. Introduces artificial intelligence programming. Prereq., CSCI 3155 or equivalent. Same as ECEN 5583.

**CSCI 5622-3. Machine Learning.** Trains students to build computer systems that learn from experience. Includes the three main subfields: supervised learning, reinforcement learning and unsupervised learning. Emphasizes practical and theoretical understanding of the most widely used algorithms (neural networks, decision trees, support vector machines, Q-learning). Covers connections to data mining and statistical modeling. A strong foundation in probability, statistics, multivariate calculus, and linear algebra is highly recommended. Prereq., graduate standing or instructor consent.

**CSCI 5722-3. Computer Vision.** Explores algorithms that can extract information about the world from images or sequences of images. Topics covered include: imaging models and camera calibration, early vision (filters, edges, texture, stereo, optical flow), mid-level vision (segmentation, tracking), vision-based control, and object recognition. Recommended prereq., probability, multivariate calculus, and linear algebra.

**CSCI 5832-3. Natural Language Processing.** Explores the field of natural language processing as it is concerned with the theoretical and practical issues that arise in getting computers to perform useful and interesting tasks with natural language. Covers the problems of understanding complex language phenomena and building practical programs. Prereq., graduate standing or instructor consent. Same as LING 5832.

**CSCI 6302-3. Speech Recognition and Synthesis.** Introduction to automatic speech recognition and understanding, conversational agents, dialogue systems, and speech synthesis/text-to-speech. Topics include the noisy channel model, Hidden Markov Models, A\* and Viterbi decoding, language modeling (N-grams, entropy), concatenative synthesis, text normalization, dialogue and conversation modeling. Prereqs., CSCI 5582 or 5832, or LING 5200, and graduate standing or instructor consent.

**CSCI 6402-3. Issues and Methods in Cognitive Science.** Interdisciplinary introduction to cognitive science, examining ideas from cognitive psychology, philosophy, education, and linguistics via computational modeling and psychological experimentation. Includes philosophy of mind; learning; categorization; vision and mental imagery; consciousness; problem solving; decision making, and game-theory; language processing; connectionism. Prereqs., graduate standing, or at least one course at the 3000-level or higher in computer science, linguistics, philosophy, or psychology. No background in computer science will be presumed. Same as EDUC 6504, LING 6200, PHIL 6310, and PSYC 6200.

**CSCI 6622-3. Advanced Machine Learning.** Covers advanced theoretical and practical topics in machine learning and latest developments in the field. Students conduct original research, either applied or theoretical, and present their results. Prereq., CSCI 5622 or instructor consent.

**CSCI 7212-3. Topics in Symbolic Artificial Intelligence.** Topics vary from year to year. Possible topics include search; knowledge representation and natural language understanding; deduction, planning, problem solving, and automatic programming; instruction and cognitive models; vision and speech; and learning, induction, and concept formation. Prereq., CSCI 5582 or instructor consent.

**CSCI 7222-3. Topics in Nonsymbolic Artificial Intelligence.** Topics vary from year to year. Possible topics include human and machine vision, signal and speech processing, artificial life, mathematical foundations of connectionism, and computational learning theory. Prereq., CSCI 5622 or instructor consent.

**CSCI 7412-2. Cognitive Science Research Practicum.** Independent, interdisciplinary research project in cognitive science for graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students should obtain commitments from two mentors for their project. Prereqs., CSCI 6402 or EDUC 6504 or LING 6200 or PHIL 6310 or PSYC 6200. Recommended prereqs., CSCI 7762 or EDUC 6505 or LING 7762 or PSYC 7765. Same as LING 7415, PSYC 7415, and EDUC 6506.

**CSCI 7422-2. Cognitive Science Research Practicum 2.** Independent, interdisciplinary research project in cognitive science for advanced graduate students pursuing a joint PhD in an approved core discipline and cognitive science. Research projects integrate at least two areas within the cognitive sciences: psychology, computer science, linguistics, education, philosophy. Students need commitments from two mentors for their project. Prereq., LING 7415 or PSYC 7415 or CSCI 7412 or EDUC 6506. Same as PSYC 7425, LING 7425, and EDUC 6516.

**CSCI 7762 (1-2). Readings and Research in Cognitive Science.** Interdisciplinary reading of innovative theories and methodologies of cognitive science. Participants share interdisciplinary perspectives through in-class and online discussion and analysis of controversial texts and of their own research in cognitive science. Required for joint PhD in cognitive science. Prereq., graduate standing. Same as EDUC 6505, LING 7762, and PSYC 7765.

**CSCI 7772 (1-2). Topics in Cognitive Science.** Reading of interdisciplinary innovative theories and methodologies of cognitive science. Students participate in the ICS Distinguished Speakers series that hosts internationally recognized cognitive scientists who share and discuss their current research. Session discussions include analysis of leading edge and controversial new approaches in cognitive science. Restricted to students enrolled in ICS Cognitive Science Academic Programs. Same as LING 7775, PSYC 7775, EDUC 7775 and SLHS 7775.

**CSCI 7782-3. Topics in Cognitive Science.** Addresses a different set of one to three topics each year. For each topic, one or two faculty members of the Institute of Cognitive Science present background material and current research. Prereq., graduate standing or instructor consent.

## Operating Systems and Hardware

**CSCI 3753-4. Operating Systems.** For computer science majors. Examines software comprising computing systems as it builds upon hardware to provide a programming environment. Looks at structure and function of editors, compilers/assemblers, linkers, etc. Basic operating systems concepts and systems programming in high-level languages. Prereqs., CSCI 2270 and one of CSCI 2400 or ECEN 2120.

**CSCI 4113-3. UNIX System Administration.** Introduces the internals of UNIX, trouble shooting system and network problems, hardware and software configuration and installation, and security aspects of hosts on the Internet. Offers students hands-on experience on dedicated laboratory workstations. Prereqs., CSCI 2270 or instructor consent. Recommended prereq., CSCI 3308.

**CSCI 4123-3. Network Laboratory.** Develops enterprise level design and configuration skills on local area networking via switching and routing, as well as the provisioning of remote data communications across diverse WAN technologies, using the latest available transport and security services. Prereq., CSCI 4273. Credit not granted for this course and TLEN 5460.

**CSCI 4133-3. Security Laboratory.** Allows students to gain practical experience with network security in a simulated network environment. Topics to be



covered include: system hardening, firewalls, intrusion detection, vulnerability assessment, and investigation. Prereq., CSCI 4273. Credit not granted for this course and TLEN 5540.

**CSCI 4273-3. Network Systems.** Focuses on design and implementation of network programs and systems, including topics in network protocols, file transfer, client-server computing, remote procedure call, and other contemporary network system design and programming techniques. Prereqs., CSCI 3753 or equivalent, and familiarity with C and UNIX. Same as CSCI 5273.

**CSCI 4593-3. Computer Organization.** Studies computer design at the gate level. Discusses microprogrammed and hardwired control units, memory design, arithmetic and logic unit, I/O, and peripheral devices. Briefly covers aspects of modern computer architecture, such as parallel processing and reduced instruction set computers. Prereqs., ECEN 2120 and 3100. Same as ECEN 4593.

**CSCI 4753-3. Computer Performance Modeling.** Presents a broad range of system measurement and modeling techniques, emphasizing applications to computer systems. Topics include system measurement, work load characterization, and analysis of data; design of experiments; simulation; and queuing theory and queuing network models. Prereq., CSCI 3753 or equivalent, and second-semester calculus. Recommended prereq., a course in statistics. Same as CSCI 5753 and ECEN 4753/5753.

**CSCI 5273-3. Network Systems.** Same as CSCI 4273.

**CSCI 5473-3. Applied Operating Systems.** Examines design and implementation of contemporary operating systems. Significant laboratory component applies practice with OS use, analysis, and internal design. Topics include OS organization and structure, process and thread management, memory management, file management, device management, network and distributed systems, and modern runtime systems. Prereq., two years programming and instructor consent.

**CSCI 5513-3. Real-Time Hardware-Software System Design.** Centers on the design and use of real-time computer systems. Gives special attention to the design, implementation, and testing of concurrent high-level language software in real-time applications. Treats the design of computer/process interfacing systems in the context of representative real-time applications. Reinforces concepts developed during the lecture portion of the class with practical experience in the real-time computing laboratory. Prereqs., ECEN 4593 and experience in programming sequential C or Pascal. Same as ECEN 5513.

**CSCI 5573-3. Advanced Operating Systems.** Intended to create a foundation for operating systems research or advanced professional practice. Examines the design and implementation of a number of research and commercial operating systems and their components, system organization and structure, threads, communication and synchronization, virtual memory, distribution, file systems, security and authentication, availability, and Internet services. Prereqs., CSCI 3753, 4593, equivalent undergraduate coursework in operating systems and computer architecture, or instructor consent. Same as ECEN 5573.

**CSCI 5593-3. Advanced Computer Architecture.** Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a machine and the design of cache memory systems. Also studies current and historically important computer architectures. Prereq., ECEN 4593 or instructor consent. Same as ECEN 5593.

**CSCI 5673-3. Distributed Systems.** Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics, and social issues. Recommended prereqs., CSCI 5573 or a course in computer networks. Same as ECEN 5673.

**CSCI 5753-3. Computer Performance Modeling.** Same as CSCI 4753.

**CSCI 7123-3. Topics in Operating Systems.** Topics selected by instructor. Possible topics are system design, measurement and evaluation, simulation, mathematical modeling, and parallelism. Prereq., CSCI 5573.

**CSCI 7143-3. Topics in Computer Systems.** Topics selected by instructor. Possible topics are online systems, multiprocessing, microprogramming, archi-

ture, data communications, and computing networks. May be repeated up to 6 total credit hours. Instructor consent required.

## Theory of Computation

**CSCI 2824-3. Discrete Structures.** Covers foundational materials for computer science that is often assumed in advanced courses. Topics include set theory. Boolean algebra, functions and relations, graphs, propositional and predicate calculus, proofs, mathematical induction, recurrence relations, combinatorics, discrete probability. Focuses on examples based on diverse applications of computer science. Prereq., CSCI 2270.

**CSCI 3104-4. Algorithms.** Advanced data structures, computational geometry, cryptography, dynamic programming, greedy algorithms, divide-and-conquer, graph algorithms (e.g., depth-first search), network algorithms (e.g., shortest paths), approximation algorithms. Prereqs., CSCI 2824 and two semesters of calculus.

**CSCI 3434-3. Theory of Computation.** Introduces the foundations of formal language theory, computability, and complexity. Shows relationship between automata and various classes of languages. Addresses the issue of which problems can be solved by computational means, and studies complexity of solutions. Prereqs., CSCI 3104 and 3155.

**CSCI 4314-3. Algorithms for Molecular Biology.** Surveys combinatorial algorithms used to understand DNA, RNA, and proteins. Introduces students to methods used to process genomic data. Topics covered include a review of algorithms and molecular biology, sequence analysis, RNA and protein structure analysis, and comparative genomics. Students will get hands-on experience processing recent genomic data. Prereqs., CSCI 2270 and CSCI 3104, or CHEM 4711, or MCDB 3500 or IPHY 4200. Same as CSCI 5314 and MCDB 4314.

**CSCI 5314-3. Algorithms for Molecular Biology.** Same as CSCI 4314 and MCDB 5314.

**CSCI 5444-3. Introduction to Theory of Computation.** Reviews regular expressions and finite automata. Studies Turing machines and equivalent models of computation, the Chomsky hierarchy, context-free grammars, push-down automata, and computability. Prereq., graduate standing or instructor consent.

**CSCI 5454-3. Design and Analysis of Algorithms.** Techniques for algorithm design, analysis of correctness and efficiency; divide and conquer, dynamic programming, etc. Advanced data structures, algorithms in graph theory, geometry, VLSI, linear algebra, etc. Lower bounds, NP-completeness, intractability. Prereqs., CSCI 2270 or equivalent.

**CSCI 5654-3. Linear Programming.** Presents algorithms, simplex, and modifications. Examines theory—duality and complementary slackness. Involves network flow algorithms. Introduces integer programming. Prereq., linear algebra.

**CSCI 5714-3. Formal Languages.** Explores context-free languages: pumping lemma and variants, closure properties, and decision properties. Involves parsing algorithms, including general and special languages, e.g., LR. Additional topics chosen by instructor. Prereq., CSCI 5444 or instructor consent.

**CSCI 6454-3. Advanced Algorithms.** Topics include matching and network flows, matroids, computational geometry, parallel computation (PRAM, hypercube, mesh). Also includes VLSI, database theory, distributed computation, cryptography, robotics, scheduling, probabilistic algorithms, approximation algorithms, average case, and amortized analysis, time permitting. Prereq., CSCI 5454.

**CSCI 7154-3. Topics in Theory of Computation.** Selected topics of current interest in theory of computation. Prereq., instructor consent.

## Programming Languages

**CSCI 3155-4. Principles of Programming Languages.** Study fundamental concepts on which programming of languages are based, and execution models supporting them. Topics include values, variables, bindings, type systems, control structures, exceptions, concurrency, and modularity. Learn how to select a language and to adapt to a new language. Prereqs., CSCI 2270 and one of CSCI 2400 or ECEN 2120.

**CSCI 4555-3. Compiler Construction.** Introduces the basic techniques used in translating programming languages: scanning, parsing, definition table man-

agement, operator identification and coercion, code selection and register allocation, error recovery. Students build a complete compiler for a simple language. Prereqs., CSCI 2824 or ECEN 3703 and CSCI 2400 or ECEN 2120. Same as ECEN 4553 and CSCI 5525.

**CSCI 5525-3. Compiler Construction.** Offers practical experience using state-of-the-art CAD tools on high-performance workstations. Provides skills needed to rapidly create little languages for specific problem domains and familiarizes students with automated software development. Prereqs., CSCI 2824 or ECEN 3703 and CSCI 2400 or ECEN 2120. Same as ECEN 5523 and CSCI 4555.

**CSCI 5535-3. Fundamental Concepts of Programming Languages.** Considers concepts common to a variety of programming languages—how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines. Prereq., CSCI 3155, or instructor consent.

**CSCI 7135-3. Topics in Programming Languages.** Topics selected by instructor. Possible topics are syntax, semantics, metacompilers, compiler design, and translator writing systems. Prereq., instructor consent.

## Numerical Computation

**CSCI 3656-3. Numerical Computation.** Covers development, computer implementation, and analysis of numerical methods for applied mathematical problems. Topics include floating point arithmetic, numerical solution of linear systems of equations, root finding, numerical interpolation, differentiation, and integration. Prereqs., two semesters of calculus, linear algebra, and either CSCI 1200 or 1300.

**CSCI 4446-3. Chaotic Dynamics.** Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension, and Lyapunov exponents. Prereqs., two semesters calculus, CSCI 1200 or equivalent, and PHYS 1110. Recommended prereqs., PHYS 1120, CSCI 3656, and MATH 3130. Same as CSCI 5446 and ECEN 4423.

**CSCI 4576-4. High-Performance Scientific Computing 1.** Introduces computing systems, software, and methods used to solve large-scale problems in science and engineering. Students use high-performance workstations and a supercomputer. First course in a two-semester sequence. Prereq., CSCI 3656 or equivalent. Same as CSCI 5576.

**CSCI 5446-3. Chaotic Dynamics.** Same as CSCI 4446 and ECEN 5423.

**CSCI 5576-4. High-Performance Scientific Computing 1.** Recommended prereq., CSCI 3656. Same as CSCI 4576.

**CSCI 5606-3. Principles of Numerical Computation.** Highlights computer arithmetic, solution of linear systems, least-squares approximations, nonlinear algebraic equations, interpolation, and quadrature. Prereqs., CSCI 3656 and three semesters of calculus, or equivalent.

**CSCI 5636-3. Numerical Solution of Partial Differential Equations.** Focuses on finite difference solution for partial differential equations, methods of SOR, ADI, conjugate gradients, finite element method, nonlinear problems, and applications. Prereqs., CSCI 5606.

**CSCI 5646-3. Numerical Linear Algebra.** Offers direct and iterative solutions of linear systems. Also covers eigen value and eigenvector calculations, error analysis, and reduction by orthogonal transformation. Prereqs., CSCI 5606.

**CSCI 6676-3. Numerical Methods for Unconstrained Optimization.** Looks at modern computational methods for solution of unconstrained optimization problems, nonlinear least squares, and systems of nonlinear equations. Techniques for building algorithms to solve problems with special structure. Prereq., CSCI 5606.

**CSCI 6686-3. Numerical Methods for Constrained Optimization.** Covers computational methods for constrained optimization. Topics include basic theory, methods for quadratic programming, active set strategies for linear constraints, and penalty and successive quadratic programming methods for nonlinearly constrained problems. Prereq., CSCI 5606.

**CSCI 7176-3. Topics in Numerical Computation.** Topics selected by instructor. Possible topics are numerical linear algebra, solution of differential equations, nonlinear algebra and optimization, data fitting, linear and nonlinear programming, and solution of large problems. Prereq., instructor consent.

## Database Systems

**CSCI 3287-3. Database and Information Systems.** Surveys data management, including file systems, database management systems design, physical data organizations, data models, query languages, concurrency, and database protection. Prereq., CSCI 3104.

**CSCI 4317-3. Genome Databases: Mining and Management.** Develops essential skills for performing genomic analyses, with focus on developing practical research tools. Introduces human genome and microbiome projects, Python/SQL scripting, accessing and understanding genomic data, sequence alignment and search, evolutionary models, expression data, biological networks, and macromolecular structure. Prereqs., MCDB 3500, CSCI 3104, or CHEM 4711; coreq., CSCI 2270. Same as CSCI 5317. Credit not granted for this course and CHEM 4621 or MCDB 4621.

**CSCI 5317-3. Genome Databases: Mining and Management.** Same as CSCI 4317. Credit not granted for this course and CHEM 5621 or MCDB 5621.

**CSCI 5417-3. Information Retrieval Systems.** Addresses practical issues in the design, implementation and analysis of modern information retrieval systems. The major focus is on Web-based applications including ad hoc retrieval, classification, and clustering. Introduces the use of open source retrieval systems, standard evaluation metrics and gold-standard evaluation collections. Recommended restriction, graduate standing in CSCI.

**CSCI 5817-3. Database Systems.** Provides an advanced treatment of basic database concepts. Prereq., CSCI 2270. Recommended prereq., CSCI 3287 and 3753.

**CSCI 7717-3. Topics in Database Systems.** Studies topics such as distributed databases, database interfaces, data models, database theory, and performance measurement in depth. Prereq., CSCI 5817 or instructor consent.

## Software Engineering

**CSCI 3308-3. Software Engineering Methods and Tools.** Focuses on software engineering methods and tools for application development, including design and system organization; using and creating reusable libraries; building, testing, and debugging; and performance evaluation. Two hours of lecture, three hours of lab per week. Prereq., CSCI 2270.

**CSCI 4308-4. Software Engineering Project 1.** Advanced practicum in which students design, implement, document and test software systems for use in industry, non-profits, government and research institutions. Offers practical experience by working closely with project sponsors. Offers extensive experience in oral and written communication throughout the software lifecycle. Students must take CSCI 4308-4318 contiguously, as the project spans the entire academic year. Prereqs., successful completion of a minimum of 36 credit hours of CSCI Foundation, Track Foundation, Track Core, and CSCI electives, and WRTG 3030. Restricted to seniors.

**CSCI 4318-4. Software Engineering Project 2.** Second semester of an advanced practicum in computer science. Students must take CSCI 4308 and 4318 contiguously as the project spans the entire academic year. Prereq., CSCI 4308.

**CSCI 4448-3. Object-Oriented Analysis and Design.** An applied analysis and design class addressing the use of object-oriented techniques. Topics include domain modeling, use cases, architectural design, and modeling notations. Students apply the techniques in analysis and design projects. Prereq., CSCI 3155 or expertise in one or more object-oriented programming languages, such as C++ or Java. Same as CSCI 5448.

**CSCI 5448-3. Object-Oriented Analysis and Design.** Same as CSCI 4448.

**CSCI 5548-3. Software Engineering of Standalone Programs.** Applies engineering principles to phases of software product development, project planning, requirements definition, design, implementation, validation, and maintenance. Emphasizes practical methods for communicating and verifying definitions and designs—prototyping, inspections, and modeling. Includes

relation to RTS and object-oriented programming. Prereqs., CSCI 1300, CSCI 2270, or instructor consent. Same as ECEN 5543.

**CSCI 5608-3. Software Project Management.** Presents topics and techniques critical to the management of software product development, including estimating, planning, quality, tracking, reporting, team organization, people management, and legal issues. Gives special attention to problems unique to software projects. Prereqs., ECEN 4583, CSCI 5548 and 4318, or equivalent industrial experience. Same as ECEN 5603.

**CSCI 5828-3. Foundations of Software Engineering.** Explores techniques, languages, and tools for development and maintenance of software systems. Topics include specification languages, configuration modeling, testing techniques, process modeling, program annotations, and program proofs.

**CSCI 6268-3. Foundations of Computer and Network Security.** Studies methods to protect information, and the ability to process and move information, from theft, misuse, tampering, destruction, and unauthorized access. Introduces foundational topics of computer and network security, including security models, cryptography, and authentication protocols. Prereq., CSCI 5273. Same as TLEN 5550.

**CSCI 7818-3. Topics in Software Engineering.** Studies selected topics of current interest in software engineering. Prereq., instructor consent.

## Graphics

**CSCI 4229-3. Computer Graphics.** Studies design, analysis, and implementation of computer graphics techniques. Topics include interactive techniques, 2D and 3D viewing, clipping, segmentation, translation, rotation, and projection. Also involves removal of hidden edges, shading, and color. Prereqs., knowledge of basic linear algebra and CSCI 2270. Same as CSCI 5229.

**CSCI 4809-3. Computer Animation.** Develops a firm understanding of the general principles of computer animation. Lectures cover the creation of models, materials, textures, surfaces, and lighting. Path and keyframe animation, particle dynamics, and rendering are introduced. Students are assigned a number of animation tutorials to carry out. Same as CSCI 5809.

**CSCI 4839-3. User Centered Design.** Develops the skills and practices necessary to apply user-centered approaches to software requirements analysis, and the design and evaluation of computer applications. Prereq., CSCI 2270. Same as CSCI 5839.

**CSCI 5229-3. Computer Graphics.** Same as CSCI 4229.

**CSCI 5809-3. Computer Animation.** Same as CSCI 4809.

**CSCI 5839-3. User Centered Design.** Restricted to graduate students or instructor consent. Same as CSCI 4839.

**CSCI 5919-3. Human Computer Interaction: Survey and Synthesis.** Examines interdisciplinary field of human computer interaction through a comprehensive content and historical survey. Considers new trajectories of inquiry and how the field merges with others. "Social computing" is emphasized as a central topic. Students across disciplines will find the course foundational for understanding human-centered technology matters, including computer scientists; social scientists; and business and media arts students. Prereq., CSCI 4839 or 5839. Recommended prereq., graduate standing.

## Electrical, Computer, and Energy Engineering

### General

**ECEN 1100-1. Freshman Seminar.** Introduces students to areas of emphasis with the ECE department through seminars presented by faculty and outside speakers. Emphasizes career opportunities, professional ethics and practices, history of the profession, and resources for academic success. Several sessions promote team building and problem solving, and provide opportunities for freshmen to meet their classmates.

**ECEN 1200-3. Telecommunications 1.** Covers the Internet and World Wide Web. Also introduces the main concepts of telecommunications, electronic publishing, audio, video, coding information theory, cryptography, data storage, and data compression.

**ECEN 1400-3. Introduction to Digital and Analog Electronics.** Introduces fundamental concepts in electrical and computer engineering such as Ohm's Law, capacitors, LEDs and 7-segment displays, transformers and rectifiers, digital logic, Fourier decomposition, frequency analysis. Lab work exposes students to commonly used instrumentation. Includes a final project. Skills in wiring, soldering and wire-wrapping are developed. Coreq., APPM 1350.

**ECEN 1840 (1-3). Independent Study.** Provides an opportunity for freshmen to do independent, creative work. Numbered ECEN 1840 through ECEN 1849. Prereq., instructor consent.

**ECEN 2010 (1-5). Special Topics.**

**ECEN 2020 (1-5). Special Topics.**

**ECEN 2050-5. Special Topics.**

**ECEN 2060 (1-5). Special Topics.**

**ECEN 2120-5. Computers as Components.** Covers computer usage in system implementation, central processor capabilities, and managing concurrency. Includes computer architecture, instruction sets, programming, input/output, interrupts, block transfers, semaphores, shared procedures, multiple processors, and memory management. Prereq., ECEN 1030 or CSCI 1300 or equivalent. Restricted to sophomores/juniors/seniors.

**ECEN 2250-3. Introduction to Circuits and Electronics.** Introduces linear circuit analysis and design, including extensive use of OP amps. Presents DC networks, including node and mesh analysis with controlled sources. Analysis of RL and RC circuits both transient and in sinusoidal steady-state using phasors. Prereq., APPM 1360. Coreq., APPM 2350.

**ECEN 2260-5. Circuits/Electronics 2.** Continues basic circuit analysis of ECEN 2250: Laplace transform techniques, transfer function, convolution, frequency response, Bode diagrams, resonant circuits, and Fourier series expansions. Includes a hands-on laboratory experience. Prereq., ECEN 2250.

**ECEN 2350-3. Digital Logic.** Covers the design and applications of digital logic circuits, including combinational and sequential logic circuits. Laboratory component introduces simulation and synthesis software and hands-on hardware design. Prereq., ECEN 1030 or CSCI 1300.

**ECEN 2830 (1-5). Special Topics.**

**ECEN 2840 (1-6). Independent Study.** Offers an opportunity for sophomores to do independent, creative work. Numbered ECEN 2840 through ECEN 2849. Prereq., instructor consent.

**ECEN 3010-3. Circuits and Electronics for Mechanical Engineers.** Covers analysis of electrical circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Includes introductory digital electronics and microprocessors/microcontrollers. Prereqs., APPM 2360 and PHYS 1140. Restricted to junior/senior MCEN majors.

**ECEN 3030-3. Electrical/Electronic Circuits Non-Major.** For students not majoring in electrical engineering. Covers analysis of electric circuits by use of Ohm's law; network reduction; super position; node and loop analysis; Thevenin's and Norton's theorems; sinusoidal signals; phasors; power in ac circuits; transient response of simple circuits; operational amplifiers; logic circuits; and flip-flops. Prereq., APPM 2360. Restricted to nonmajors. Same as GEEN 3854.

**ECEN 3070-3. Edges of Science.** Examines the evidence for paranormal phenomena, reasons for skepticism, and physical models that could account for the data. Reviews controversial scientific theories that overcame barriers to acceptance, and how worldviews shift. Considers the scientific method and ways uncontrolled factors might influence experiments. Develops skills in statistical analysis of data. Includes group projects testing for anomalous and parapsychological effects. Not accepted as a technical elective for engineering majors. Prereq., MATH 1011 or equivalent.

**ECEN 3100-5. Digital Logic.** Covers the design and applications of digital logic circuits, including combinational and sequential logic circuits. Laboratory component introduces simulation and synthesis software and hands-on hardware design. Prereq., ECEN 1030 or CSCI 1300.

**ECEN 3170-3. Energy Conversion 1.** Introduces block diagrams, conventional/renewable energy sources, power electronics, magnetic circuits, transformers and power systems, forces/torques of electric machines. Employs a top-down approach to present applications first and then discuss components. Uses PSPICE, MATHEMATICA, MATLAB. Prereq., ECEN 3250.

**ECEN 3250-5. Circuits/Electronics 3.** Develops a basic understanding of active semiconductor devices. Focuses on building an understanding of BJT and CMOS devices in both digital and analog application. Prereq., ECEN 2260.

**ECEN 3300-5. Linear Systems.** Characterization of signals and linear systems in time and frequency domains. Both continuous and discrete time systems are considered. Laboratory exercises consider linear filters and applications using computer simulations. The examples are drawn from communication systems, control systems, and digital signal processing. Prereqs., ECEN 2260 and APPM 2360.

**ECEN 3320-3. Semiconductor Devices.** Highlights the fundamentals of semiconductor materials and devices. Topics include the electrical and optical properties of semiconductors, the theory of PN junctions, bipolar and field-effect transistors, and optoelectronic devices. Prereq., ECEN 3250.

**ECEN 3400-5. Electromagnetic Fields and Waves.** Electromagnetic fields are covered at an introductory level, starting with electrostatics and continuing with DC current, magnetostatics, time-varying magnetic fields, waves on transmission lines, Maxwell's equations, plane waves, and basics of guided waves and antennas. Ten-twelve labs cover EM effects in circuits, four-point probe, ammeters, motors inductive and capacitive coupling on a pc-board, time-domain reflectometry, and antennas. Prereqs., APPM 2350, PHYS 1110, and ECEN 2260. Restricted to juniors/seniors.

**ECEN 3410-3. Electromagnetic Waves and Transmission.** Studies reflected and transmitted plane waves in layered media, Poynting's theorem of electromagnetic power, hollow wave-guides, and two-conductor transmission line theory and practice, Smith chart and impedance matching, and elements of antenna theory. Prereq., ECEN 3400. Coreq., ECEN 4324. Restricted to juniors/seniors.

**ECEN 3810-3. Introduction to Probability Theory.** Covers the fundamentals of probability theory, and treats the random variables and random processes of greatest importance in electrical engineering. Provides a foundation for study of communication theory, control theory, reliability theory, optics, and portfolio analysis. Prereqs., APPM 2350 and 2360. Credit not granted for this course and MATH 4510 or APPM 3570.

**ECEN 3840 (1-6). Independent Study.** Offers an opportunity for juniors to do independent, creative work. Numbered ECEN 3840-3849. Prereq., instructor consent.

**ECEN 3930-6. ECE Co-op Education.** Participate in a cooperative education program working with a corporate or government entity. Individual assignments are arranged between the department and the outside employer. This course is offered only through Continuing Education. May be repeated up to 24 credit hours. Prereq., ECEN 2120, 2260, minimum GPA of 2.85 required. Restricted to sophomore, junior and senior EEEN and ECEN majors.

**ECEN 4000-3. Special Topics.**

**ECEN 4120-3. Neural Network Design.** Introduces basic (artificial) neural network architectures and learning rules. Emphasizes mathematical analysis of these networks, methods of training them, and application to practical problems such as pattern recognition, signal processing, and control systems. Shows how to construct a network of "neurons" and train them to serve a useful function. Prereqs., APPM 2360 or MATH 3130, and CSCI 1300 or equivalent. Same as ECEN 5120.

**ECEN 4610-3. Capstone Laboratory.** Hands-on laboratory experience for teams of 3-5 members in the systematic proposal, design, build, integration, test, and documentation of an electronic/computer based system. The result will be a reliably operating, stand-alone analog/digital system, with publication quality technical documentation. Prereq., ECEN 2120, 3100, 3250, 3300, 3400, 3810, plus ECEN 4593 for ECEN majors. Restricted to seniors.

**ECEN 4840 (1-6). Independent Study.** Offers an opportunity for seniors to do independent, creative work. Numbered ECEN 4840-4849. Prereq., instructor consent.

**ECEN 5120-3. Neural Network Design.** Same as ECEN 4120.

**ECEN 5830-3. Special Topics.**

**ECEN 5840 (1-6). Independent Study.** Offers an opportunity for students to do independent, creative work at the master's level. Numbered ECEN 5840-5849. Prereq., advisor consent.

**ECEN 6800 (0-8). Master of Engineering Report.**

**ECEN 6940-3. Master's Degree Candidate.** Numbered ECEN 6940-6949.

**ECEN 6950 (1-6). Master's Thesis.**

**ECEN 7840 (1-6). Independent Study.** Offers an opportunity for students to do independent, creative work at the doctoral level. Numbered ECEN 7840-7849. Prereq., advisor consent.

**ECEN 8990 (0-10). Doctoral Thesis.**

## Bioengineering

**ECEN 4001 (1-4). Special Topics.** Credit and subject matter to be arranged. Numbered ECEN 4001-4049. Prerequisites vary.

**ECEN 4011 (1-4). Special Topics.** Same as ECEN 5011.

**ECEN 4021 (1-4). Special Topics.**

**ECEN 4811-3. Neural Signals and Functional Brain Imaging.** Explores bioelectric and metabolic signals generated by the nervous system from two standpoints: 1) their biophysical genesis and role in neural integration and 2) neurotechnologies such as electroencephalography, magnetoencephalography, deep brain stimulation, and functional magnetic resonance imaging. Prereqs., ECEN 2260 or 3030, ASEN 3300, or instructor consent. Same as ECEN 5811 and ASEN 4216.

**ECEN 4821-3. Neural Systems and Physiological Control.** A biophysical exploration of human physiology from the standpoints of control systems and neural information processing. Topics include: neural control of movement and cardiovascular performance, tissue growth and repair, carcinogenesis, and physiological responses to microgravity. Prereqs., ECEN 2260 or 3030, ASEN 3300, or instructor consent. Same as ECEN 5821 and ASEN 4426/5426.

**ECEN 4831-3. Brains, Minds, and Computers.** Provides background for the design of artificially intelligent systems based upon our present knowledge of the human brain. Includes similarities and differences between the brain and computers, robots, and common computer models of brain and mind. Emphasizes the neuron as an information processor, and organization of natural as well as synthetic neural networks. Prereq., ECEN 2260 or 3030, or instructor consent. Same as ECEN 5831, ASEN 4436/5436.

**ECEN 5011 (1-4). Special Topics.** Same as ECEN 4011.

**ECEN 5021 (1-4). Special Topics.**

**ECEN 5811-3. Neural Signals and Functional Brain Imaging.** Same as ECEN 4811 and ASEN 4216

**ECEN 5821-3. Neural Systems and Physiological Control.** Same as ECEN 4821 and ASEN 4426/5426.

**ECEN 5831-3. Brains, Minds, and Computers.** Same as ECEN 4831, and ASEN 4436/5436.

## Communications

**ECEN 3002 (3-5). Special Topics.**

**ECEN 4002 (1-4). Special Topics.**

**ECEN 4012 (1-4). Special Topics.**

**ECEN 4242-3. Communication Theory.** Covers modern digital and analog communication systems, Fourier analysis of signals and systems, signal transmission, amplitude modulation, angle modulation, digital communication systems, and behavior of communication systems in the presence of noise, including both analog and digital systems. Prereqs., ECEN 3300 and ECEN 3810 or equivalent.

**ECEN 4532-3. Digital Signal Processing Laboratory.** Develops experience in code development, debugging, and testing of real-time digital signal processing algorithms using dedicated hardware. Applications include filtering, sig-

nal synthesis, audio special effects, and frequency domain techniques based on the Fast Fourier Transform. Prereq., ECEN 3300. Coreq., ECEN 4632. Same as ECEN 5532.

**ECEN 4632-3. Introduction to Digital Filtering.** Covers both the analysis and design of FIR and IIR digital filters. Discusses implementations in both software and hardware. Emphasizes use of the FFT as an analysis tool. Includes examples in speech processing, noise canceling, and communications. Prereq., ECEN 3300. Restricted to seniors.

**ECEN 4652-2. Communication Laboratory.** Involves laboratory experiments demonstrating material taught in ECEN 4242. Uses spectrum analysis to study baseband signals and signal processors. Topics include noise, AM, FM, PM, sampling, quantizing/encoding, TDM, FDM, equalizers, and a complete communication system. Prereq. or coreq., ECEN 4242.

**ECEN 5012-3. Special Topics.**

**ECEN 5032-3. Special Topics.**

**ECEN 5532-3. Digital Signal Processing Laboratory.** Same as ECEN 4532.

**ECEN 5612-3. Noise and Random Processes.** Reviews probability theory, convergence and probability bounds, multivariable normal theory, sequences of random variables and stochastic processes, Bernoulli and Poisson processes, wide-sense stationary processes, and correlation functions and power spectra. Also includes linear systems with random inputs and Gauss-Markov processes, first- and second-order properties of ARMA processes, and Markov chains. Prereqs., ECEN 3300 and 3810 or MATH 4510.

**ECEN 5622-3. Information Theory and Coding.** Entropy rates of information sources, fundamental limits of data compression, Huffman and arithmetic codes; mutual information, fundamental limits of information transmission over noisy communication channels with/without feedback. Selected topics in information storage, lossy data compression, and network information theory. Prereqs., ECEN 3810 or equivalent, or instructor consent.

**ECEN 5632-3. Theory and Application of Digital Filtering.** Digital signal processing and its applications are of interest to a wide variety of scientists and engineers. The course covers such topics as characterization of linear discrete-time circuits by unit pulse response, transfer functions, and difference equations, use of z-transforms and Fourier analysis, discrete Fourier transform and fast algorithms (FFT), design of finite and infinite impulse response filters, frequency transformations, study of optimized filters for deterministic signals.

**ECEN 5652-3. Detection and Extraction of Signals from Noise.** Introduces detection, estimation, and time series analysis. Topics include hypothesis testing, detection of known form and random signals, least squares parameter estimation, maximum likelihood theory, minimum mean-squared error estimation, Kalman-Wiener filtering, prediction in stationary time series, and modal analysis. Applications include studies in communications, control, and experimental modeling. Prereq., ECEN 5612.

**ECEN 5672-3. Digital Image Processing.** Course objective is to present the fundamental techniques available for image representation and compression (e.g., wavelets), filtering (e.g., Wiener and nonlinear filter), and segmentation (e.g., anisotropic diffusion). Prereq., ECEN 5632 or instructor consent.

**ECEN 5682-3. Theory and Practice of Error Control Codes.** Block and convolutional codes for reliable transmission of digital data over unreliable noisy channels. Algebraic and dsp characterizations of cyclic codes such as BCH/RS codes. Decoding algorithms for block codes and the Viterbi algorithm. Graph codes and iterative decoding. Prereq., ECEN 3300.

**ECEN 5692-3. Principles of Digital Communication.** Techniques for efficient and reliable transmission of information over bandwidth and power constrained communication channels; digital modulation methods, power spectral density calculations, optimum receiver principles, error rate analysis, channel coding potential in wired/wireless media, trellis coded modulation, and equalization. Prereqs., ECEN 3300 and 5612 or equivalents. Recommended prereqs., ECEN 5622 and 5632.

## Computer and Digital Systems

**ECEN 3003 (3-5). Special Topics.**

**ECEN 3703-3. Discrete Mathematics for Computer Engineers.** Emphasizes elements of discrete mathematics appropriate for computer engineering. Topics: logic including temporal logic, proof techniques including induction, algorithms, complexity, relations, graph theory and algorithms. Prereqs., CSCI 1300 and APPM 1360.

**ECEN 4013 (1-4). Special Topics.**

**ECEN 4023 (1-4). Special Topics.** Same as ECEN 5023.

**ECEN 4053 (1-4). Special Topics.** Same as ECEN 5053.

**ECEN 4423-3. Chaotic Dynamics.** Explores chaotic dynamics theoretically and through computer simulations. Covers the standard computational and analytical tools used in nonlinear dynamics and concludes with an overview of leading-edge chaos research. Topics include time and phase-space dynamics, surfaces of section, bifurcation diagrams, fractal dimension, and Lyapunov exponents. Prereqs., two semesters calculus, CSCI 1200 or equivalent, and PHYS 1110. Recommended prereqs., PHYS 1120, CSCI 3656, and MATH 3130. Same as CSCI 4446 and ECEN 5423.

**ECEN 4553-3. Compiler Construction.** Introduces the basic techniques used in translating programming languages: scanning, parsing, definition table management, operator identification and coercion, code selection and register allocation, error recovery. Students build a complete compiler for a simple language. Prereqs., ECEN 2120 and 3703. Same as CSCI 4555 and ECEN 5523.

**ECEN 4583-3. Software System Development.** Lectures deal with techniques for product requirements definition, project planning, coding, verification, validation, performance evaluation, and maintenance of medium-scale (2-3000 line) systems. Primary emphasis is on practical application of these techniques to a specified software project. Students work in teams to produce appropriate documents for each phase and are responsible for project completion according to specification and schedule. Course project is written in C on a UNIX look-alike system; prior knowledge of C or UNIX is not required. Prereq., CSCI 2270.

**ECEN 4593-3. Computer Organization.** Studies computer design at the gate level. Discusses microprogrammed and hardwired control units, memory design, arithmetic and logic unit, I/O, and peripheral devices. Briefly covers aspects of modern computer architecture, such as parallel processing and reduced instruction set computers. Prereq., ECEN 2120, 3100. Same as CSCI 4593.

**ECEN 4613-3. Embedded System Design.** Introduces system hardware and firmware design for embedded applications. Students independently design and develop a hardware platform encompassing a microcontroller and peripherals. Firmware is developed in C and assembly. A significant final project is designed, developed, documented, and presented. Prereqs., ECEN 2120 and 3100, or instructor consent. Recommended prereqs., ECEN 3250 and 4593. Same as ECEN 5613.

**ECEN 4623-3. Real-Time Embedded Systems.** Design and build a microprocessor-based embedded system application requiring integration of sensor/actuator devices, a real-time operating system and application firmware and software. Real-time rate monotonic theory and embedded architecture are covered. Prereq., ECEN 2120 and ECEN 3100, or instructor consent. Recommended prereq., ECEN 4613. Same as ECEN 5623.

**ECEN 4633-3. Hybrid Embedded Systems.** Introduces system hardware and design techniques for embedded and hybrid reconfigurable systems. Intended for those interested in developing projects using hardware description languages to build application-specific computing systems. Industry standards are used for design, development, and debugging. Prereqs., ECEN 2120, 3100, and 4593, or equivalent. Same as ECEN 5633.

**ECEN 4753-3. Computer Performance Modeling.** Presents a broad range of system modeling techniques, emphasizing applications to computer systems. Covers stochastic processes, queuing network models, stochastic Petri nets, and simulation (including parallel processing techniques). Prereq., CSCI 3753 or equivalent and second-semester calculus. Recommended prereq., a course in statistics. Same as CSCI 4753, 5753, and ECEN 5753.

**ECEN 5023 (1-4). Special Topics.** Same as ECEN 4023.

**ECEN 5053 (1-4). Special Topics.** Same as ECEN 4053.

**ECEN 5423-3. Chaotic Dynamics.** Same as ECEN 4423 and CSCI 5446.

**ECEN 5503-3. Computer Systems Design and Architecture.** Covers digital logic circuits, assembly language programming, and gate-level computer design and architecture. Also discusses computer arithmetic algorithms, I/O, peripheral device performance, networking, and the Internet. Limited to graduate students. For ECE/CS majors with nontraditional backgrounds.

**ECEN 5523-3. Compiler Construction.** Same as ECEN 4553 and CSCI 5525.

**ECEN 5533-3. Fundamental Concepts of Programming Languages.** Considers concepts common to a variety of programming languages—how they are described (both formally and informally) and how they are implemented. Provides a firm basis for comprehending new languages and gives insight into the relationship between languages and machines. Prereq., CSCI 3155 or instructor consent. Same as CSCI 5535.

**ECEN 5543-3. Software Engineering of Standalone Programs.** Applies engineering principles to phases of software product development, project planning, requirements definition, design, implementation, validation, and maintenance. Emphasizes practical methods for communicating and verifying definitions and designs—prototyping, inspections, and modeling. Includes relation to RTS and object-oriented programming. Prereqs., CSCI 1300, CSCI 2270, or instructor consent. Same as CSCI 5548.

**ECEN 5553-3. Parallel Processing.** Examines a range of topics involved in using parallel operations to improve computational performance. Discusses parallel architectures, parallel algorithms and parallel programming languages. Architectures covered include vector computers, multiprocessors, network computers, and data flow machines. Prereq., background in computer organization, introduction to programming languages, elementary numerical analysis, ECEN 4593 and CSCI 3656, or instructor consent. Same as CSCI 5551.

**ECEN 5573-3. Advanced Operating Systems.** Same as CSCI 5573.

**ECEN 5583-3. Artificial Intelligence.** Prereq., CSCI 3245 or equivalent. Same as CSCI 5582.

**ECEN 5593-3. Advanced Computer Architecture.** Provides a broad-scope treatment of important concepts in the design and implementation of high-performance computer systems. Discusses important issues in the pipelining of a machine and the design of cache memory systems. Also studies current and historically important computer architectures. Prereq., ECEN 4593 or instructor consent. Same as CSCI 5593.

**ECEN 5603-3. Software Project Management.** Presents topics and techniques critical to the management of software product development, including estimating, planning, quality, tracking, reporting, team organization, people management, and legal issues. Gives special attention to problems unique to software projects. Prereqs., ECEN 4583, 5543, and CSCI 4318, or equivalent industrial experience. Same as CSCI 5608 and EMEN 5031.

**ECEN 5613-3. Embedded System Design.** Same as ECEN 4613.

**ECEN 5623-3. Real-Time Embedded Systems.** Same as ECEN 4623.

**ECEN 5633-3. Hybrid Embedded Systems.** Same as ECEN 4633.

**ECEN 5673-3. Distributed Systems.** Examines systems that span multiple autonomous computers. Topics include system structuring techniques, scalability, heterogeneity, fault tolerance, load sharing, distributed file and information systems, naming, directory services, resource discovery, resource and network management, security, privacy, ethics, and social issues. Recommended prereq., CSCI 5573 or a course in computer networks. Same as CSCI 5673.

**ECEN 5753-3. Computer Performance Modeling.** Same as ECEN 4753 and CSCI 4753/5753.

## Electromagnetics

**ECEN 3004 (3-5). Special Topics.**

**ECEN 4024 (1-4). Special Topics.** Same as ECEN 5024.

**ECEN 4224-3. High Speed Digital Design.** Covering fundamentals of high-speed properties of: logic gates, measurement techniques, transmission lines, ground planes and layer stacking, terminations, vias, power systems,

connectors, ribbon cables, clock distribution and clock oscillators. Prereq., ECEN 3400. Recommended prereq., ECEN 3410. Same as ECEN 5224.

**ECEN 4324-3. Fundamentals of Microsystem Packaging.** Introduction to the fundamentals of microsystems packaging. This is a seminar style course which surveys topics in microsystem packaging such as: electrical package design, design for reliability, thermal management, multichip packaging, IC Assembly, sealing and encapsulation, and board assembly. Coreq., ECEN 3410 or instructor consent. Restricted to seniors. Same as ECEN 5324.

**ECEN 4634-3. Microwave and RF Laboratory.** Introducing RF and microwave measurement methods. A laboratory course whose experiments build on material learned in ECEN 3410 (Electromagnetic Waves and Transmission): electromagnetic waves, transmission lines, waveguides, time-domain reflection, frequency-domain measurement, microwave networks, impedance matching, antenna pattern measurement, radar, and simple nonlinear concepts such as harmonics, square-law detection, mixing and transmitter/receiver applications. Prereq., ECEN 3410. Restricted to students with a minimum of 47 hours.

**ECEN 5024 (1-4). Special Topics.** Same as ECEN 4024.

**ECEN 5104-3. Computer-Aided Microwave Circuit Design.** Emphasizes the design of strip-line and microstrip circuits, using a CAD package. Discusses design of impedance transformers, amplifiers, switches, phase shifters, etc. Assignments include design of typical circuits and their analysis using a microwave circuit analysis program. Laboratory includes measurements using a network analyzer facility on a typical circuit designed and fabricated by students. Prereq., ECEN 3410.

**ECEN 5114-3. Waveguides and Transmission Lines.** Intermediate course deals with guided-wave systems at HF, microwave, and optical frequencies. Modern waveguiding structures, including circular metallic waveguides, microstrip transmission lines, and optical waveguides are treated. Additional material may include waveguide losses, excitation of waveguides, microwave network theory, coupled-mode theory, resonators, and pulse propagation in waveguides. Prereq., ECEN 3410.

**ECEN 5134-3. Electromagnetic Radiation and Antennas.** Covers elementary antenna source, cylindrical wire antennas, loop antennas, radiation patterns and antenna gain, aperture sources such as horns and dishes, linear arrays, mutual effects, ray formulations, antenna noise and temperature, and transmission formulations. Prereq., ECEN 3410.

**ECEN 5154-3. Computational Electromagnetics.** Provides a computational study of microwave circuits and antennas, using finite-difference, finite-element, and moment methods. Requires students to develop algorithms, write and execute programs, and prepare reports analyzing results. Circuits include waveguides, microstrip lines, and center-fed dipole antennas. Prereq., ECEN 3410.

**ECEN 4224-3. High Speed Digital Design.** Same as ECEN 4224.

**ECEN 5254-3. Radar and Remote Sensing.** Examines active techniques of remote sensing, with emphasis on radar fundamentals, radar wave propagation, scattering processes, and radar measurement techniques and design. Examines specific radar systems and applications, such as laser radar, synthetic aperture radar, and phased arrays for atmosphere, space, land, and sea applications. Prereqs., ECEN 3300 and 3400, or instructor consent.

**ECEN 5264-3. Propagation Effects on Satellite and Deep-Space Telecommunications.** Studies the role of propagation effects in design of Earth-space telecommunication systems. Looks at effects dependent upon total electron content (TEC) along path, including Faraday rotation and range delay. Also covers ionospheric and interplanetary scintillation; tropospheric clear-air effects, including refraction, ducting, and range delay; absorption, scatter, and cross polarization due to precipitation and clouds. Prereq., ECEN 3410.

**ECEN 5274-3. Radar Science and Techniques.** Studies atmospheric radar fundamentals. Examines scattering by precipitation and atmospheric turbulence; long-wavelength radars and the dynamics of the middle and upper atmosphere; design of meteorological and clear-air radars; profiling tropospheric winds, temperature, and humidity by radar and radiometry; and ionospheric sounding using ionosondes and incoherent-scatter radars. Prereq., ECEN 5254 or instructor consent.

**ECEN 5324-3. Fundamentals of Microsystem Packaging.** Same as ECEN 4324.

**ECEN 5634-3. Graduate Microwave and RF Laboratory.** Introducing RF and microwave measurement methods. A laboratory course whose experiments build on material learned in ECEN 3410 (Electromagnetic Waves and Transmission): electromagnetic waves, transmission lines, waveguides, time-domain reflection, frequency-domain measurement, microwave networks, impedance matching, antenna pattern measurement, radar, and simple nonlinear concepts such as harmonics, square-law detection, mixing and transmitter/receiver applications. Prereq., ECEN 3410.

**ECEN 6144-3. Electromagnetic Boundary Problems.** Provides mathematical and physical fundamentals necessary for the systematic analysis of electromagnetic fields problems. Requires some maturity in electromagnetics. Prereq., ECEN 5114 or 5134 or instructor consent. Formerly ECEN 5144.

## Nanostructures and Devices

**ECEN 4345-3. Introduction to Solid State.** Covers basic crystallography, lattice vibrations, free electron theory, energy band theory, and semiconducting, dielectric, and optical and superconducting materials and devices, emphasizing properties relevant to solid state electronics and optoelectronics. Prereq., ECEN 3400.

**ECEN 4375-3. Microstructures Laboratory.** Offers experience in monolithic silicon integrated circuit fabrication techniques, including IC layout, pattern compiling and generation, mask making, oxidation, photolithography, diffusion, implantation, metallization, bonding, process analysis, and testing. Includes design project. Prereq., ECEN 3320. Same as ECEN 5375.

**ECEN 4555-3. Principles of Energy Systems & Devices.** Develops principles underlying electronic, optical and thermal devices, materials and nanostructures for renewable energy. Provides a foundation in statistical thermodynamics, uses it to analyze the operation and efficiency limits of devices for photovoltaics, energy storage (batteries & ultra-capacitors), chemical conversion (fuel cells & engines), solid state lighting, heat pumps, cooling, and potentially harvesting zero-point energy from the vacuum. Prereq., ECEN 3810. Prereq. or coreq., PHYS 2130 or 2170 or instructor consent. Restricted to engineering students. Same as ECEN 5555.

**ECEN 4645-3. Introduction to Optical Electronics.** Introduces lasers, Gaussian optics, modulators, nonlinear optics, optical detectors, and other related devices. Prereq., ECEN 3410. Restricted to juniors and seniors. Same as ECEN 5645.

### ECEN 5005 (1-4). Special Topics.

**ECEN 5345-3. Introduction to Solid State.** Core course for further studies in solid state materials and devices. Covers crystal and reciprocal lattices; phonons; electrons in three dimensional solids and nanostructures; energy band structure of semiconductors, electron transport, optical properties; and basics of quantum wells. Course uses quantum mechanical methods. Prereqs., ECEN 3400 and basic quantum mechanics or instructor consent.

**ECEN 5355-3. Principles of Electronic Devices 1.** Relates performance and limitations of solid state devices to their structures and technology. Examines semiconductor physics and technology. Includes PN-junction, MOS, and optoelectronic devices. For both advance circuit and device engineers. Prereq., ECEN 3320 or instructor consent.

**ECEN 5365-3. Semiconductor Materials and Devices 1.** Includes an introduction to time-independent quantum mechanics and perturbation theory, tunneling, application to quantum-well electronic and optical devices, electrons in a crystalline solid, Bloch's theorem, energy bands and energy gaps, the effective mass approximation, a survey of energy bands for real crystals: Si, Ge, GaAs, InP, AlGaAs, etc., band structure engineering, and the electrical and optical properties of compound semiconductors. Prereq., ECEN 3120, and ECEN 4345 or 5345.

**ECEN 5375-3. Microstructures Laboratory.** Same as ECEN 4375.

**ECEN 5385-3. Optical Properties of Materials.** Surveys optical properties of materials important in optoelectronic and optical devices. Covers the relationships between optical constants, optical properties of semiconductors, dielectrics, ferroelectrics, liquid crystals, and metals. Prereq., ECEN 4345 and 5345, or PHYS 4340, or equivalent.

**ECEN 5555-3. Principles of Energy Systems and Devices.** Same as ECEN 4555.

**ECEN 5645-3. Introduction to Optical Electronics.** Introduces lasers, Gaussian optics, modulators, nonlinear optics, optical detectors, and other related devices. Prereq., ECEN 3410. Same as ECEN 4645.

## Optics

### ECEN 4006 (1-4). Special Topics.

### ECEN 4016 (1-4). Special Topics.

**ECEN 4106-3. Photonics.** Deals with the generation, transmission, modification and detection of light. Applications include fiber optics communications, data storage, sensing, and imaging. Leads to understanding of fundamental physical principles used in the analysis and design of modern photonic systems. Prereqs., ECEN 3300 and PHYS 2130. Restricted to seniors.

**ECEN 4116-3. Introduction to Optical Communications.** Given data rates, distance, reliability or bit error rates, the information required to specify the type of fiber, the source, the wave length, type of modulation, repeater or optical amplifiers, and detectors will be presented. Prereq., ECEN 3400 or equivalent. Same as TLEN 5480.

**ECEN 4606-3. Undergraduate Optics Laboratory.** Introduces fundamental concepts, techniques, and technology of modern optical and photonic systems. Individual labs cover particular fields of optical technology, including light sources such as lasers and LEDs, interferometers, fiber-optic communications, photodetection, spectrometers, and holography. Practical skills such as how to align an optical system will also be emphasized. Prereq., ECEN 3400 or PHYS 4510 and 4000-level optics course. Recommended coreq., ECEN 4106. Restricted to juniors/seniors.

**ECEN 4616-3. Optoelectric System Design.** Examines optics, optical systems, and electro-optics devices with the goal of integrating optical and electro-optical devices into optoelectronic systems. System design is covered with emphasis given to resolution, field of view, signal-to-noise ratio, speed of operation, and other system constraints. Prereq., ECEN 3400. Same as ECEN 5616.

**ECEN 4696-2. Optical Circuits Laboratory.** Provides students with the opportunity to study the characteristics of the components that go into optical fiber communication systems. This lab can be operated over the Internet so that students can do the lab individually on their own time schedule and explore the effects of variations in parameters to a greater extent than they can do in a typical lab session if desired. Prereq., ECEN 2260 and 3400. Recommended prereq., ECEN 3810. Restricted to junior/senior engineering majors. Same as TLEN 5485.

### ECEN 5016 (1-4). Special Topics.

**ECEN 5156-3. Physical Optics.** Core course for the optics program. Covers the application of Maxwell's equations to optical waves and media. Topics include polarization, dispersion, geometrical optics, interference, partial coherence, and diffraction. Prereq., ECEN 3410.

**ECEN 5166-3. Guided Wave Optics.** Builds up the concepts necessary to understand guided wave optical systems. Topics include slab wave-guides, semiconductor lasers, fiber optics, and integrated optics. Prereqs., ECEN 4645 or 5645, and ECEN 5156.

**ECEN 5606-3. Optics Laboratory.** Consists of 13 optics experiments that introduce the techniques and devices essential to modern optics, including characterization of sources, photodetectors, modulators, use of interferometers, spectrometers, and holograms, and experimentation of fiber optics and Fourier optics. Prereq., undergraduate optics course such as PHYS 4510. Same as PHYS 5606.

**ECEN 5616-3. Optoelectric System Design.** Same as ECEN 4616.

**ECEN 5626-3. Active Optical Devices.** Analysis of active optical devices such as semiconductor laser, detector and flat panel display by clearly defining and interconnecting the fundamental physical mechanism, device design and operating principles and device performance. Recommended prereq., ECEN 5355.

**ECEN 5696-3. Fourier Optics and Holography.** Topics include holography, Fourier transform properties of lenses, two-dimensional convolution and correla-

tion functions, spatial filtering, and optical computing techniques. Also covers coherent and incoherent imaging techniques, tomography, and synthetic aperture imaging. Prereqs., ECEN 3300 and 3410, or instructor consent.

**ECEN 6016 (1-3). Special Topics.**

## Power

**ECEN 4017 (1-4). Special Topics.**

**ECEN 4167-3. Energy Conversion 2.** Studies the derivation of the dynamic equations of motion of electromechanical systems, linear and rotary motion machines based on variational principles and basic force laws. Looks at equivalent circuits in abc and dqo coordinates for AC and DC machines. Discusses conditions under which an electromagnetic torque can be produced. Applies theory to the most important modes of steady-state and transient operation of electrical energy converters. Prereq., ECEN 3170.

**ECEN 4517-3. Renewable & Power Electronics Lab.** Focuses on analysis, modeling, design, and testing of electrical energy processing systems in a practical laboratory setting. Studies power electronics converters for efficient utilization of available energy sources, including solar panels and utility. A final design project involves design, fabrication, and testing of a solar power system. Prereq., ECEN 3170. Restricted to seniors. Same as ECEN 5517.

**ECEN 4797-3. Introduction to Power Electronics.** An introduction to switched-mode converters. Includes steady-state converter modeling and analysis, switch realization, discontinuous conduction mode, and transformer-isolated converters. AC modeling of converters using averaged methods, small-signal transfer functions, feedback loop design, and transformer design. Prereq., ECEN 3250. Restricted to junior and senior engineering majors. Same as ECEN 5797.

**ECEN 4827-3. Analog IC Design.** Covers the fundamentals of transistor-level analog integrated circuit design. Starting from device models, introduces principles of dc biasing, frequency response analysis and feedback techniques, as well as the use of CAD tools for simulation, circuit design, layout and verification of single-stage and multi-stage amplifiers, operational amplifiers, and comparators. Prereq., ECEN 3250. Restricted to engineering majors. Same as ECEN 5827.

**ECEN 5517-3. Renewable & Power Electronics Lab.** Introduces practical techniques of power electronics: duty-cycle control of dc-dc converters, including basic controller circuits, gate drivers, power stage components, magnetics design, and small-signal frequency response; current-mode control, snubber design, flyback transformer design, and principles of grounding and layout. Culminates in a design project involving a stand-alone solar power system. Prereq., ECEN 5797. Same as ECEN 4517.

**ECEN 5787-3. Power Quality Phenomena Power Systems.** Single-time and periodic disturbances of power systems and their causes and effects on sensitive (electronic) end-use devices and power system components are studied and modeled. Measurement techniques of the impact of such disturbances (power quality phenomena) on devices as well as prevention and mitigating techniques are addressed. Prereq., ECEN 3170.

**ECEN 5797-3. Introduction to Power Electronics.** Same as ECEN 4797.

**ECEN 5807-3. Modeling and Control of Power Electronic Systems.** Studies modeling and control topics in power electronics. Averaged switch modeling of converters, computer simulation, ac modeling of the discontinuous conduction mode, the current programmed mode, null double injection techniques in linear circuits, input filter design, and low-harmonic rectifiers. Prereq., ECEN 5797.

**ECEN 5817-3. Resonant and Soft-Switching Techniques in Power Electronics.** Covers resonant converters and inverters, and soft switching; sinusoidal approximations in analysis of series, parallel, LCC, and other resonant dc-dc and dc-ac converters; state-plane analysis of resonant circuits; switching transitions in hard-switched and soft-switched PWM converters; zero-voltage switching techniques, including resonant, quasi resonant, zero-voltage transition, and auxiliary switch circuits. Prereq., ECEN 5797 or instructor consent required.

**ECEN 5827-3. Analog IC Design.** Same as ECEN 4827.

**ECEN 5837-3. Mixed-Signal IC Design.** Design of core analog circuits in mixed analog and digital systems, including data converters and sampled-data circuitry, and system level IC design methodologies and CAD based circuit design and layout techniques in mixed analog and digital ICs. Prereq., MCEN 5837. Restricted to majors.

## Dynamical Systems and Control

**ECEN 4018 (1-4). Special Topics.**

**ECEN 4028 (1-4). Special Topics.**

**ECEN 4138-3. Control Systems Analysis.** Provides modeling of dynamic systems for electrical, chemical, hydraulic, and mechanical systems using block diagrams and signal flow graphs. Compares open and closed-loop configurations. Prereq., ECEN 3300, background in Laplace transforms, linear algebra, and ordinary differential equations. Restricted to juniors/seniors.

**ECEN 4638-2. Control Systems Laboratory.** Provides experience in control system design and analysis, using both real hardware and computer simulation. Covers the entire control system design cycle: modeling the system, synthesizing a controller, conducting simulations, analyzing the design to suggest modifications and improvements, and implementing the design for actual testing. Prereq., ECEN 3300. Coreq., ECEN 4138. Restricted to juniors/seniors in engineering.

**ECEN 5008 (1-4). Special Topics.**

**ECEN 5018 (1-4). Special Topics.**

**ECEN 5028 (1-4). Special Topics.**

**ECEN 5418-3. Automatic Control Systems 1.** Coverage of principles of control systems with Multiple Inputs and Multiple Outputs (MIMO). Topics include MIMO state-space theory, applications of the singular value decomposition (SVD), coprime factorization methods, frequency domain topics, and an introduction to H-infinity design. Prereqs., ECEN 3300, 4138, and 5448, or equivalents.

**ECEN 5438-3. Robot Control.** Provides a comprehensive treatment of the mathematical modeling of robot mechanisms and the analysis methods used to design control laws for these mechanisms. Prereqs., ECEN 4138 and PHYS 1110.

**ECEN 5448-3. Advanced Linear Systems.** Offers a state space approach to analysis and synthesis of linear systems, state transition matrix, controllability and observability, system transformation, minimal realization, and analysis and synthesis of multi-input and multi-output systems. Prereq., ECEN 3300 and 4138.

**ECEN 5458-3. Sampled Data and Digital Control Systems.** Provides an analysis and synthesis of discrete-time systems. Studies sampling theorem and sampling process characterization, z-transform theory and z-transfer function, and stability theory. Involves data converters (A/D and D/A), dead-beat design, and digital controller design. Prereqs., ECEN 3300 and 4138.

**ECEN 7438-3. Theory of Nonlinear Systems.** Similar to ECEN 5438 except at a more advanced level and with more topics covered: limit cycles, functional analysis approach to input-output stability, analysis and synthesis of time-varying systems, feedback linearization and its applications, and bang-bang control. Prereqs., ECEN 5418 and 5448.

## VLSI CAD Methods

**ECEN 4009 (1-4). Special Topics.**

**ECEN 4049 (1-4). Special Topics.**

**ECEN 4109-3. Very Large Scale Integrated (VLSI) Systems Design.** Understand how very large digital circuits are implemented at the IC level. Techniques for implementing large digital systems in NMOS and CMOS technology are presented, including a discussion of tradeoffs made to achieve high performance designs. Entails layout and design projects using a set of layout and simulation tools. Prereqs., ECEN 3100, 3250.

**ECEN 5049 (1-4). Special Topics.**

**ECEN 5109-3. Very Large Scale Integrated (VLSI) Systems Design.** Understand how very large digital circuits are implemented at the IC level. Techniques for implementing large digital systems in NMOS and CMOS technology



are presented, including a discussion of tradeoffs made to achieve high performance designs. Entails layout and design projects using a set of layout and simulation tools.

**ECEN 5139-3. Formal Verification of VLSI Systems.** Covers two-level and multilevel minimization, optimization via expert systems, algebraic and Boolean decomposition, layout methodologies, state assignment, encoding and minimization, silicon compilation. Prereqs., ECEN 4703 and general proficiency in discrete mathematics and programming.

**ECEN 6139-3. Logic Synthesis of VLSI Systems.** Studies synthesis and optimization of sequential circuits, including retiming transformations and don't care sequences. Gives attention to hardware description languages and their application to finite state systems. Also includes synthesis for testability and performance, algorithms for test generation, formal verification of sequential systems, and synthesis of asynchronous circuits. Prereqs., ECEN 5129, 5139, and CSCI 5454.

**ECEN 7849 (1-6). Independent Study.** Offers an opportunity for students to do independent, creative work at the doctoral level. Numbered ECEN 7840–7849. Prereq., advisor consent.

## Engineering Honors

**EHON 1151-3. Critical Encounters.** Explores critical, literary and philosophical approaches to the following related problems: 1) how we organize knowledge and construct meaning, and 2) how we locate a sense of self as both individuals and members of various groups amidst the resources and demands of competing interpretations, traditions challenges and circumstances. Prereq., honors standing or instructor consent required.

**EHON 1500-1. Honors Reading Group.** Faculty led reading seminars, focusing on specific text or texts chosen by the faculty. Special attention will be paid to group formation and the process of collaborative learning. prereq., honors standing or instructor consent.

**EHON 4051-1. Dimensions of Leadership.** Explores the many dimensions of leadership that exceed technical knowledge: the ethical, societal, cultural, interpersonal, and personal. Through seminars, workshops and exposure to leaders, students will reflect upon their engineering education in light of the multifaceted demands of effective leadership and their own personal career goals. Students will take an active role in shaping the course. Prereq., junior standing; honors standing or instructor consent.

## Engineering Management

**EMEN 4030-3. Project Management Systems.** Acquaints the student with multidisciplinary aspects of project management, including the relationship between schedule, project cost, and performance. Uses qualitative and quantitative tools to facilitate project management skills. Restricted to juniors and seniors.

**EMEN 4050-3. Leadership and Professional Skills.** Provides basic concepts of leadership and the essential skills required to become an effective leader/manager. Students will be provided the opportunity for personal development through exercises in communication and leadership effectiveness. Other major topics include leadership styles, managing commitments, change management, negotiation, conflict resolution, organizational culture, emotional intelligence, team dynamics, and business ethics. Restricted to juniors and seniors.

**EMEN 4100-3. Business Methods and Economics for Engineers.** Covers cost concepts, financial statements, and the company economic environment. Includes concepts and methods of analysis of the time value of money, comparison of project alternatives before and after taxes, cash flows, replacement analysis, risk management, and financial cash statements. Restricted to juniors and seniors.

**EMEN 4825-3. Entrepreneurial Business Plan Preparation.** Instructs students in the necessary elements of a business plan and how to prepare a complete well-written plan for an entrepreneurial business venture. Students work in interdisciplinary business-engineering five-person teams to create a business concept and take it through to business plan completion. Same as ESBM 4830.

**EMEN 4850-3. Technology Ventures and Marketing.** Acquiring basic management and marketing skills is essential to successfully participating in technology venture development whether in a start-up company or Fortune 500 company. In this course, students learn to evaluate a technology, consider its viability as product, and learn the basic tenets of marketing with emphasis on developing a technology innovation into a commercially successful product with a mind on customer development as a key aspect of product development. Restricted to juniors and seniors.

**EMEN 5000-3. Engineering Analysis.** Provides an introduction to the logical and systematic thinking required to evaluate and solve typical engineering problems in mechanics, electricity, thermodynamics, fluid mechanics, and light. Emphasizes understanding the physical behavior of systems and applying the principles and laws from the physical sciences to analyze these systems. Required for nonengineers seeking admission to the graduate technology management curriculum track. Not for degree credit.

**EMEN 5005-3. Introduction to Applied Statistical Methods.** Covers foundations for statistical reasoning and statistical applications. Topics include descriptive statistics, introduction to probability, random variables, discrete and continuous probability distributions, sampling theory and sampling distributions, statistical inference (point and interval estimation and hypothesis testing), and simple regression. All material taught is based upon case studies from business and industry. Not for degree credit.

**EMEN 5010-3. Introduction to Engineering Management.** Provides a general introduction to the principles and methods of technical management covering a variety of topics in leadership, strategic planning, product management, entrepreneurship, finance, value chains, management of R&D, and economic environments. Industry guest speakers provide real-life examples and applications. Required for all degree students.

**EMEN 5020-3. Finance and Accounting for Engineering Managers.** Provides the concepts and skills necessary to financially analyze project and assess financial performance and status of an organization. Includes the time value of money, comparison of alternatives, taxes, risk management, cash flow, and financial cash statements. Required for all degree students. Prereq., EMEN 5010 or instructor consent.

**EMEN 5025-3. Entrepreneurial Finance for Engineers.** Teaches students to prepare, interpret and use financial information, in the context of startup and early stage enterprises. Includes historical financial statements, budgets and the budgeting process, and the use of financial information in raising capital.

**EMEN 5030-3. Project Management.** Presents the basic skills required to manage a wide range of technical projects. Topics include selecting project alternatives, managing project teams, developing project plan elements, risk management, monitoring and controlling projects, and financial analysis of projects. Skills learned are applied to a representative project.

**EMEN 5031-3. Software Project Management.** Understand unique considerations of the software life cycle that impact project management. Emphasize configuration management, code reviews, architectural influences, and quality assurance with automated testing. Explore Capability Maturity Model (CMM) and Unified Modeling Language (UML) impact on project success. Recommended prereq., some software development experience. Same as ECEN 5603.

**EMEN 5032-3. Advanced Topics in Project Management.** Covers advanced topics in project management from a systems view based on the Project Management Body of Knowledge (PMBOK); spans the entire project life cycle. Prereq., EMEN 5030 or equivalent.

**EMEN 5040-3. Quality, Strategy, and Value Creation.** Introduces business performance excellence (BPE) including history of Quality Sciences, Six Sigma, and Deming's Theory of Profound Knowledge. Addresses use of strategic planning, policy deployment, and Total Asset Utilization to exceed customer requirements and maximize profitability. Addresses topics strategically and tactically through case analysis, field study, and experiential learning. Prereq., EMEN 5010 or instructor consent. Similar to OPIM 6030.

**EMEN 5041-3. Advanced Topics in Value Creation.** Studies methods designed to maximize excellence in business performance. Advanced study includes interactions with the customers and suppliers, integrated manufacturing, and meeting customer requirements while focusing on maximizing profitability.

These characteristics are addressed both strategically and tactically through the use of case analysis, field study, and experiential learning for both the production and service sectors. Prereq., EMEN 5040. Recommended prereq., EMEN 5042.

**EMEN 5042-3. Methods for Quality Improvement.** In-depth investigation of the concepts, tools, and techniques used in the management and measurement of quality and productivity. Topics include basic statistics and probability; process variation; statistical process control charting and capability analysis for process, product, and management systems; and an introduction to design of experiments (DOE) in business and industry. Prereq., EMEN 5040 or instructor consent.

**EMEN 5043-3. Advanced Topics in Quality Systems/Engineering.** Advanced study of methods, tools, techniques, and systems associated with advanced quality applications. Includes a survey of advanced process control technologies, control schemes, and measurement system analysis. Prereq., EMEN 5042.

**EMEN 5050-3. Leadership.** Provides working engineers a background in leadership and management theory; enables students to develop practical skills in leading and managing through numerous exercises. Topics include authentic leadership, leadership styles, managing commitments, conflict resolution, change management, organizational culture, emotional intelligence, team dynamics, and business ethics. Required for all degree students. Prereq., EMEN 5010 or instructor consent. Same as TLEN 5050.

**EMEN 5051-3. Technology Ventures and Leadership.** Acquiring basic management and leadership skills is essential to successfully participating in technology venture development whether in a start-up company or Fortune 500 company. Using a multitude of case studies the student will gain an understanding and practice the skills required to evaluate a technology, consider its viability as a product and analyze the product development effort required for the technology. The student will also learn the leadership skills required to successfully lead a product development team.

**EMEN 5080-3. Ethical Decision-Making in Engineering Management.** Provide students with the ability to recognize ethical issues and dilemmas affecting managers in the workplace; understand various models and practices offering solutions to these issues; and understand how to create a culture of ethics and integrity in supporting and/or building a profitable, healthy, and responsible organization.

**EMEN 5090-3. High Technology Marketing.** Acquiring marketing know-how is essential for engineers interested in technology and product development. Students learn the basic tenets of marketing with emphasis on developing a technology innovation into a commercially successful product with a mind on customer development as a key aspect of product development. Highlighted will be in-depth discussions of real-world case studies and providing the student with marketing strategies for the high tech environment.

**EMEN 5300-3. Management of Research and Development.** Provides practical, tested tools to manage research and development in industry and in university and government laboratories. R&D strategies are emphasized, as are innovation and creativity concepts and techniques. R&D portfolio techniques are emphasized and are the basis for a team project. Prereq., EMEN 5010 or instructor consent.

**EMEN 5400-3. Principles of Product Management.** Provides state-of-the-art techniques for improving the identification and creation of new products, services, and brands that provide an exceptional customer experience. Both proven and emerging management techniques in new product management are covered. Prereq., EMEN 5010 or instructor consent.

**EMEN 5405-3. Systems Engineering: Requirements.** Provides students with an understanding of how to prepare a program for effective and timely specification development and analytical methods for specification development. Management aspects covered include traceability, margins and budgets, requirements validation, specification publishing, and use of database systems. Restricted to graduate students or instructor consent required.

**EMEN 5410-3. Systems Engineering: Synthesis.** Provides methods for transforming a set of requirements in a series of specifications into a physical reality through product design, material procurement, and manufacturing transforms. The solution is developed through integration and optimization.

This is the second course in a three course systems engineering sequence. Restricted to graduate students or instructor consent required.

**EMEN 5415-3. Systems Engineering: Verification.** Provides students with methods to plan and implement effective product verification process on a program involving development of complicated products. Applies a process perfected on military programs, but the process is generic and can be applied effectively to commercial products. A worst case product and program complexity are considered permitting tailoring of the process for less complex cases. Restricted to graduate students or instructor consent required.

**EMEN 5430-3. Software Product Management.** Explores software product management activities from product concept to launch while ensuring both market visibility and customer satisfaction. Includes market research and opportunity analysis, software requirements, pricing and profitability, alpha-beta program feedback, operational readiness, sales channels and partner strategies. Recommended prereq., some software development experience.

**EMEN 5500-3. Operations Management.** Provides an introduction to management concepts and techniques for managing the ongoing value creation activities of a wide range of organizations. Value creation includes manufacturing hardware, developing software, and delivering services. Emphasizes the customer perspective and views products as one way of delivering exceptional services. Addresses globalization and supply chains challenges. Prereq., EMEN 5010 or instructor consent. Credit not granted for this course and OPIM 6080.

**EMEN 5600-3. Survey of Operations Research.** Applications oriented survey of operations research topics including linear and integer programming, network analysis, dynamic programming, nonlinear programming, decision analysis, Markov chain and Markovian decision models, queuing theory, and simulation. Same as OPIM 6070.

**EMEN 5610-3. Advanced Statistical Methods for Engineering Research.** Combines statistical methods with practical applications and computer software. Develops commonly used statistical models such as analysis of variance as well as linear and logistic regression. The statistical models are implemented and interpreted in the context of actual data sets using available statistical software. Continuation of EMEN 5005. Prereq., EMEN 5005.

**EMEN 5620-3. Data Mining and Screening Experiments for Engineering Research.** Combine intermediate and advanced statistical methods with practical research applications. Develops commonly used statistical models such as Two and Three-Way Analysis of Variance and the analysis of Fractional Factorial Designs for the solution of common business and industrial research problems. The statistical models are implemented and interpreted in the context of actual data sets using available statistical software.

**EMEN 5710-3. Business Simulation for Engineers.** Using an internet-based computer simulation, teams will be placed in a realistic international business setting. Teams will start up and run a company two years in compressed time (eight rounds of decision making). Repeatedly, teams will be expected to plan and execute a business strategy by undertaking coordinated marketing, human resources, operations, finance, and accounting actions. Instructor permission required.

**EMEN 5825-3. Entrepreneurial Business Plan Preparation.** Instructs students in the necessary elements of a business plan and how to prepare a complete, well-written plan for an entrepreneurial business venture. Students work in teams to create a business concept and take it through business plan completion. Recommended prereq., EMEN 5020 or equivalent.

**EMEN 5840 (1-3). Independent Study Project.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Prereq., EMEN 5010.

**EMEN 5900-3. Research Techniques in Engineering Management.** Explores commonly used research methods including analytical, agreement, descriptive, and relational methods; experimental design including incorporation, nesting, blocking, and controlling; threats to the internal and external validity of research. Sampling procedures and considerations, measurement validity and reliability, and managing the research study are also reviewed. Prereq., EMEN 5005 or equivalent. Same as TLEN 5750.

**EMEN 6805-3. Capstone Preparation.** Students determine capstone research question, conduct literature review, develop research methodology and proj-

ect plan, write a proposal, and select capstone committee. Restricted to students who have completed 21 credit hours toward the EMEN degree. Prereq., either EMEN 5900 if choosing an applications-oriented capstone or EMEN 5825 if choosing a business plan capstone, and selection of a capstone advisor.

**EMEN 6810-2. Capstone Completion.** Continues EMEN 6805 as the second half of a two-course sequence for the engineering management capstone project. Students conduct agreed-upon research, research and analyze results, develop recommendations, write a final report, and present the project to the committee for evaluation. Prereq., EMEN 6805.

**EMEN 6830-3. Project Management Capstone.** Evaluate project management practices in the student's work unit, company, or in another organization. Identify strengths and weaknesses of the major product management processes as outlined in the Project Management Body of Knowledge (PM-BOK). Opportunities for improvement and methods for implementation are expected. Prereqs., EMEN 5030 and 5032 and acceptance into the Project Management Certification option.

## Environmental Engineering

**EVEN 1000-1. Introduction to Environmental Engineering.** Introduces students to environmental engineering as an academic major and a career. Covers air quality, aquatic ecology, chemical processing, energy, site remediation, and water resources and treatment. Includes reading and writing on the history of environmental engineering, major environmental issues, and professional ethics.

**EVEN 2840 (1-3). Independent Study: General Topics.** General topics relating to environmental engineering. One-on-one assistance with an instructor.

**EVEN 4100-3. Environmental Sampling and Analysis.** Introduces students to hands-on environmental sampling and analysis techniques for characterization of surface water, subsurface water, soils and sediments, and air. Laboratories include stream sampling, drilling, monitoring well installation, water level, slug tests, air sampling. Prereqs., CVEN 4404 and 4414, fluid mechanics, or instructor consent.

**EVEN 4830-3. Special Topics.**

**EVEN 4840 (1-3). Independent Study: General Topics.** General topics relating to environmental engineering. One-on-one assistance with an instructor. May be repeated up to 6 total credit hours.

**EVEN 4980-3. Senior Thesis 1.** Provides faculty-supervised independent research in environmental engineering for students planning to complete a senior thesis. To be taken prior to EVEN 4990, during the final year before graduation. Prereq., senior standing and instructor consent.

**EVEN 4990-3. Senior Thesis 2.** Continuation of EVEN 4980. Consists of final phase of faculty-supervised independent research, the preparation of a written thesis, and an oral defense of the research to a committee. Prereq., EVEN 4980.

## General Engineering

**GEEN 1100-3. Social Impact of Technology.** Introduces undergraduate students to the social impact of technology and how technology impacts all aspects of life, the health of planet Earth, and how people interact with each other. Fulfills Engineering social science requirements. Restricted to freshmen and sophomore engineering majors.

**GEEN 1300-3. Introduction to Engineering Computing.** Introduces the use of computers in engineering problem solving, including elementary numerical methods. Teaches programming fundamentals, including data and algorithm structure, and modular programming. Software vehicles include Excel/VBA and Matlab. Coreq., APPM 1350 or equivalent.

**GEEN 1342-3. Special Topics.**

**GEEN 1350-1. Calculus 1 Work Group.** Provides problem-solving assistance to students enrolled in APPM 1350. Student groups work in collaborative learning environment. Student participation is essential. Grading under pass/fail option only; cannot be used to meet engineering degree requirements. Coreq., APPM 1350.

**GEEN 1360-1. Calculus 2 Work Group.** Provides problem solving assistance for students enrolled in APPM 1360. Conducted in a collaborative learning environment. Student work groups solve calculus problems with assistance of facilitator. Grading under pass/fail option only; cannot be used to meet engineering degree requirements. Prereq., APPM 1350. Coreq., APPM 1360.

**GEEN 1400-3. Engineering Projects.** First-year engineering students work in teams to apply their scientific and mathematical skills to interdisciplinary design/build engineering projects. Completed projects are exhibited at an end-of-semester design expo. See <http://itll.colorado.edu/GEEN1400>. In lieu of a textbook (available online), each student is expected to contribute up to \$75 towards their design project and poster, and purchase his/her own pair of safety glasses. Restricted to freshmen and sophomore engineering majors.

**GEEN 1500-1. Introduction to Engineering.** Provides an introduction to the profession of engineering, to include its historical development, ethical expectations, and an examination of its current discipline specialization. Provides sufficient knowledge of the engineering disciplines necessary to make an informed career choice. Restricted to freshmen and sophomore engineering majors.

**GEEN 1510-1. Self Management and Leadership Principles 1.** Develops group cohesiveness, mutual support, multicultural awareness, and leadership skills. Topics include collaborative learning, motivation, time management and study skills, personal assertiveness, and career awareness. Open to new freshmen and transfer students. Controlled enrollment. Fulfills one credit hour of the engineering social science requirement.

**GEEN 1520-1. Self Management and Leadership Principles 2.** Continuation of GEEN 1510. Controlled enrollment. Prereq., GEEN 1510.

**GEEN 3400-3. Invention and Innovation.** Introduction to invention and product innovation with a hands-on approach. Students explore the invention process, learn engineering skills, and explore entrepreneurship (patenting, intellectual property, marketing, raising capital). Student teams design, build, and test a potentially commercial product, and exhibit at an end-of-semester design expo. Restricted to freshmen and sophomore engineering majors.

**GEEN 3851-3. Statics for Engineers.** Examines vector treatment of force systems and their resultants; equilibrium of frames and machines, including internal forces and three-dimensional configurations; static friction; properties of surfaces, including first and second moments; hydrostatics; and minimum potential energy and stability. Prereq., PHYS 1110. Recommended coreq., APPM 2350. Same as CVEN 2121.

**GEEN 3852-3. Thermodynamics for Engineers.** Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions and cycles. Prereq., APPM 2350. Same as MCEN 3012.

**GEEN 3853-3. Fluid Mechanics for Engineers.** Introduces fluid mechanics and momentum transfer, emphasizing the application of these principles to engineering systems. Prereqs., APPM 2350 or 2360, and GEEN 1300 or CSCI 1300. Same as CHEN 3200.

**GEEN 3854-3. Circuits for Non-majors.** Intended for students not majoring in electrical engineering. Covers analysis of electric circuits by use of Ohm's law, network reduction, super position, node and loop analysis, Thevenin's and Norton's theorems, sinusoidal signals, phasors, power in AC circuits, transient response of simple circuits, operational amplifiers, logic circuits and flip-flops. Prereqs., APPM 1350, 1360 and 2360. Same as ECEN 3030.

**GEEN 3860 (1-3). Special Topics: Journey to Space.** Trains students interested in spacecraft design and control concepts to better prepare them for potential aerospace careers. The weekly course schedule includes one lecture and one team meeting with students involved with COSGC's current Colorado CubeSat (CO3Sat-1) satellite program. Lecture topics include: Spacecraft Systems, Orbit Design and Analysis, Altitude Control and Design, Structural Design and Analysis, Thermal Analysis, Spacecraft Communication, Mission Operations, etc.

**GEEN 3930-6. Engineering Co-op.** Students enrolled in this course participate in a previously arranged, department-sponsored cooperative education program with a university, government agency, or industry. This course is offered only through Continuing Education and may be repeated up to 24 credit

hours (four co-op terms). GPA higher than 2.75 is required. GPA higher than 3.00 is strongly recommended.

**GEEN 3940-6. Engineering Educational Co-op.** Students will apply knowledge and skills acquired in engineering courses to help rural K–12 students master science, math and engineering principles. Students will make extensive use of the “TeachEngineering” digital library. Students will refine knowledge of various engineering topics, and will develop a better understanding of the rewards and challenges of teaching STEM topics in a K–12 academic setting. Recommended prereqs., 45 hours of tech coursework with 2.75 minimum GPA.

**GEEN 4830-3. Special Topics.** May be repeated up to 6 total credit hours. Restricted to engineering students.

## Herbst Program of Humanities

**HUEN 1010-3. Introduction to the Humanities.** Explores a wide variety of challenging, interesting, and relevant humanistic expressions (fiction, philosophy, plays, poetry, art, music, etc.). Classes are small and discussion-based in order to focus on the practical skills needed to excel in both remaining humanities and social science electives and as a professional engineer. Restricted to freshmen and sophomores.

**HUEN 1843-3. Special Topics.** Students should check with the department for specific semester topics. May be repeated up to 6 total credit hours. Restricted to freshmen engineering majors.

**HUEN 2010-3. Tradition and Identity.** Explores the place and possibility of personal identity both within and against the influence of tradition, including family, culture, language, and social, political and economic institutions. Via literature and film, wrestles with the nature of freedom, self-determination, and belonging.

**HUEN 2100-3. History of Science and Technology to Newton.** When was the odometer invented? How do you build a Pyramid? What did Galileo do, really? What is the difference between science and technology, and when did they each begin? This course spans invention and discovery from the Stone Age to the age of Newton, raising questions about culture, history, custom, and personal expectation. Prepare yourself for some surprises. Restricted to freshmen and sophomore engineering majors. Formerly HUEN 1100.

**HUEN 2120-3. History of Modern Science from Newton to Einstein.** Surveys the great discoveries and theoretical disputes from Newtonian celestial mechanics to the theory of relativity. Includes physics, astronomy, chemistry, geology, and biology, with units on scientific method, evolution, light and quantum theory. Original sources (selections by Newton, Faraday, Lavoisier, Darwin, etc.) bring students into contact with the scientists themselves. Restricted to CEAS students.

**HUEN 2130-3. History of Modern Technology from 1750 to the Atomic Bomb.** Surveys the great innovations from the Steam Age to the Atomic Age. Includes transportation, modern construction, communications, and internal combustion. Supplements textbook accounts with technical drawings, patents, etc., and with selections by Edison, Carnegie, Tesla, Bell, etc. Studies the sociological impact of social change via contemporary sources in literature, philosophy, painting and film. Restricted to CEAS students.

**HUEN 2210-3. Engineering, Science, and Society.** Explores challenges that engineering and science pose for society as well as the ways societies shape or impede science and engineering. Case studies include contemporary issues like global warming, nuclear weapons, and genetic engineering as well as such classic cases as the execution of Socrates. Core texts in the Western Tradition supplement contemporary articles and films.

**HUEN 2843 (1-3). Special Topics.** Students should check with the department for specific semester topics. May be repeated up to 6 total credit hours. Restricted to freshmen and sophomores.

**HUEN 3100-3. Humanities for Engineers 1.** First course in a two-semester sequence of Herbst Humanities Program for engineering students. Small group seminar that explores the values and ideals of culturally and historically significant novelists, artists, dramatists, and philosophers. May fulfill upper-level writing requirement. Minimum GPA and application required. See <http://engineering.colorado.edu/herbst>. Prereq., junior standing and program approval.

**HUEN 3200-3. Humanities for Engineers 2.** Continuation of HUEN 3100. Discusses culturally and historically significant readings in small-group seminars. May be repeated up to 6 total credit hours. Prereq., HUEN 3100 or instructor consent.

**HUEN 3700-3. Culture Wars in Rome.** Set in Rome, Italy, this Maymester course investigates the cultural contrasts among three different “Romes”, ancient pagan, aristocratic Rome; medieval Christian theocratic Rome; and modern secular democratic Rome. To do so, it draws on evidence from Roman literature, politics, art, and architecture. Requires some preparatory work in Boulder. Restricted to sophomores/juniors/seniors.

**HUEN 3750-3. Xi’an, China: Self-Awareness and Images of the Other.** Explore Chinese culture in this Study Abroad course. Study ideas of self and other within special historical, social, political, and economical circumstances. Chinese and American concepts of self and society, of individual, collective, and national identities will be analyzed. The course will be held on the campus of Xi’an Jiaotong University, China. Prereq., HUEN 1010 or equivalent.

**HUEN 3840 (1-3). Independent Study.** Counts toward the humanities and social science degree requirements for a BS in the college of engineering. May be repeated up to 3 total credit hours. Prereq., instructor consent.

**HUEN 3843-3. Special Topics.** Check with department for specific semester topics. May be repeated up to 6 total credit hours. Restricted to juniors and seniors.

**HUEN 4100-3. Humanities for Engineers 3.** Continuation of HUEN 3100 and 3200. Focuses on humanities themes or texts of increased complexity, often in comparative perspective, including nonliterary works. Prereqs., HUEN 3100 and 3200.

**HUEN 4200-3. Humanities for Engineers 4.** Continuation of HUEN 4100. Provides opportunity to pursue a variety of humanistic themes related to Herbst Humanities Program. Prereq., HUEN 4100.

## Mechanical Engineering

### Math

**MCEN 1000-1. Introduction to Mechanical Engineering.** Lect. and lab. Introduces facets of mechanical engineering including history of the profession, mechanical engineering curriculum, industries in which mechanical engineers practice, and expectations and tools for academic success. Students participate in hands-on experiences, visit industry, make oral presentations, meet faculty and practicing professionals, and develop goal statements. Restricted to MCEN majors.

**MCEN 3030-3. Computational Methods.** Studies fundamental numerical techniques for the solution of commonly encountered engineering problems. Includes methods for linear and nonlinear algebraic equations, data analysis, numerical differentiation and integration, ordinary and partial differential equations. Prereqs., GEEN 1300 and APPM 2360, or equivalent, including a working knowledge of Matlab.

**MCEN 4120-3. Engineering Statistics.** Focuses on probability and statistics, emphasizing engineering applications. Studies frequency distributions; statistical hypotheses and estimation; nonparametric, linear regression, and correlation; nonlinear and multiple regression; analysis of variance; and quality control. Prereq., APPM 2360.

**MCEN 5020-3. Methods of Engineering Analysis 1.** Studies selected topics from linear algebra, ordinary differential equations, and Fourier series. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications. Prereq., APPM 2360 or equivalent.

**MCEN 5040-3. Methods of Engineering Analysis 2.** Studies selected topics from the theory of complex variables, integral transform methods, partial differential equations, and variational methods. Assigns computer exercises. Correlates with analysis topics in other mechanical engineering graduate courses, and emphasizes applications. Prereq., MCEN 5020 or equivalent.

**MCEN 7120-3. Perturbation Methods.** Teaches regular and singular perturbation methods for solving ordinary and partial differential equations and for evaluating integrals. Emphasizes formulation of mathematical models in fluid

mechanics, combustion, heat transfer, solid mechanics, dynamics, and wave propagation. Prereq., MCEN 5020 and 5040, or equivalent.

## Fluids

**MCEN 3021-3. Fluid Mechanics.** Examines fundamentals of fluid flow with application to engineering problems. Explores fluid statics and kinematics; conservation equations for mass, momentum, and energy; Bernoulli and Euler equations; potential flow; laminar and turbulent viscous boundary layers; laminar and turbulent pipe flow; and compressible fluid flow. Prereqs., APPM 2360 and MCEN 2023.

**MCEN 4131-3. Air Pollution Control Engineering.** Introduces air quality regulations, meteorology, and modeling; methods for controlling major classes of air pollutants, including particulate matter and oxides of sulfur and nitrogen; and control technology for industrial sources and motor vehicles. Requires interdisciplinary design projects. Prereq., MCEN 3021 or equivalent. Same as MCEN 5131.

**MCEN 4141-3. Indoor Air Pollution.** Air pollutants cause material damage and adversely affect human health. People spend over 80 per cent of their time indoors; often, air pollutant levels are higher indoors than outdoors. In this course we study air pollution in indoor environments and design appropriate control technologies. Prereqs., MCEN 3021 and 3022. Same as MCEN 5141.

**MCEN 5021-3. Introduction to Fluid Dynamics.** Focuses on physical properties of gases and liquids, and kinematics of flow fields. Analyzes stress; viscous, heat-conducting Newtonian fluids; and capillary effects and surface-tension-driven flow. Other topics include vorticity and circulation, ideal fluid flow theory in two and three dimensions, Schwartz-Christoffel transformations, free streamline theory, and internal and free-surface waves. Coreq., MCEN 5020 or equivalent.

**MCEN 5041-3. Viscous Flow.** Highlights exact solution of Navier-Stokes equations and fundamentals of rotating fluids. Considers Low Reynolds number flow; similarity solutions; viscous boundary layers, jets, and wakes; and unsteady viscous flow. Prereq., MCEN 5021 or equivalent.

**MCEN 5121-3. Compressible Flow.** Applies energy, continuity, and momentum principles to compressible flow. Topics include normal and oblique shocks; Prandtl-Meyer expansion; methods of characteristics; and one-, two-, and three-dimensional subsonic, supersonic, and hypersonic flows. Prereq., MCEN 5021 or equivalent.

**MCEN 5131-3. Air Pollution Control Engineering.** Same as MCEN 4131.

**MCEN 5141-3. Indoor Air Pollution.** Same as MCEN 4141.

**MCEN 7221-3. Turbulence.** Hydrodynamic stability theory, equations for turbulent flows, free shear flows and boundary layers, homogeneous and isotropic turbulence, overview of turbulent combustion, reaction kinetics, energy equation, Favre averaging, PDFs, premixed and nonpremixed flame modeling, and recent developments.

## Thermal

**MCEN 3012-3. Thermodynamics.** Explores fundamental concepts and basic theory, including first and second laws of thermodynamics, properties, states, thermodynamic functions and cycles. Prereq., APPM 2350. Same as GEEN 3852.

**MCEN 3022-3. Heat Transfer.** Studies fundamentals of heat transfer by conduction, convection, and radiation. Provides applications to heat exchangers, solar panels, and boiling and mass transfer. Also covers numerical methods for solving heat transfer problems and design of engineering equipment involving heat transfer processes. Prereqs., MCEN 3012 and 3021.

**MCEN 3122-3. Thermodynamics 2.** Offers advanced topics and applications, including thermodynamics of state, entropy and probability, thermodynamic cycles, and reacting and nonreacting mixtures. Provides application to engines and power generation by conventional and alternative energy technologies. Most assignments are design oriented. Prereqs., MCEN 3012 and 3021.

**MCEN 4152-3. Introduction to Combustion.** Description of the mechanisms by which fuel and oxidizers are converted into combustion products. Application to practical combustion devices such as Otto, Diesel, gas turbine, and power plant combustion systems. Consideration of combustion-generated air

pollution, fire safety, and combustion efficiency. Prereq., MCEN 3012. Recommended prereqs., MCEN 3021 and 3022. Same as MCEN 5152.

**MCEN 4162-3. Energy Conversion.** Examines common energy-conversion methods and devices. Topics include power-cycle thermodynamics, turbocompressor and expander processes, combustion systems, and applications and limitations of direct energy-conversion systems. Prereq., MCEN 3012.

**MCEN 5022-3. Thermodynamics.** Offers a comprehensive presentation of macroscopic and statistical thermodynamics and representative applications, from an axiomatic formulation designed to develop and clarify thermodynamic property relationships. Includes thermodynamic functions and derivatives, quantum mechanics, kinetic theory of gases, black body radiation, chemical equilibrium, and molecular spectroscopy.

**MCEN 5042-3. Heat Transfer.** Studies development of equations governing transport of heat by conduction, convection, and radiation, and their solution. Includes analytical and numerical solution of initial and boundary value problems representative of heat conduction in solids. Describes heat transfer in free and forced convection, including laminar and turbulent flow. Also involves radiation properties of solids, liquids, and gases and transport of heat by radiation.

**MCEN 5122-3. Thermodynamics 2.** Offers advanced topics and applications, including thermodynamics of state, entropy and probability, thermodynamic cycles, and reacting and nonreacting mixtures. Provides application to engines and power generation by conventional and alternative energy technologies. Most assignments are design oriented.

**MCEN 5142-3. Computational Fluid Dynamics, Heat Transfer, and Combustion.** Finite difference, finite volume, finite element, and spectral methods, consistency, stability and convergence of numerical schemes, governing equations for reacting flows, convection, diffusion, convection-diffusion problems, matrix solution methods-cyclic reduction, Fourier, Jacobin, Gauss Siedel, SOR, ADI, Chebschev acceleration, Lax-Wendroff scheme, Mc-Cormack scheme, transonic small disturbance equation solution, staggered grids, simple scheme, discrete Fourier transform. Students work on two substantial projects using commercial software.

**MCEN 5152-3. Introduction to Combustion.** Same as MCEN 4152.

**MCEN 7122-3. Combustion Phenomena.** Applies multicomponent fluid equations of motion and chemical thermodynamics to a variety of combustion problems. Covers droplet combustion, premixed and diffusion flames, boundary layer combustion, detonation wave theory, topics related to internal combustion engines, and liquid and solid rockets. Prereq., MCEN 3012 and 3021.

## Solids

**MCEN 2023-3. Statics and Structures.** Covers statics of particles, equivalent force systems, rigid bodies, equilibrium of rigid bodies in two and three dimensions, analysis of truss and frame structures, uniaxially-loaded members, deformation and stress, distributed force systems, friction. Lectures and homework assignments involve computer work and hands-on laboratory work in the ITLL, documented by written reports. Prereq., APPM 1360.

**MCEN 2063-3. Mechanics of Solids.** Covers shear force and bending moment, torsion, stresses in beams, deflection of beams, matrix analysis of frame structures, analysis of stress and strain in 2-D and 3-D (field equations, transformations), energy methods, stress concentrations, and columns. Lectures and homework assignments involve computer work and hands-on laboratory work in the ITLL, documented by written reports. Prereq., MCEN 2023.

**MCEN 3043-3. Dynamics.** Covers dynamic behavior of particle systems and rigid bodies; 2-D and 3-D kinematics and kinetics; impulse, momentum, potential, and kinetic energy; and work, collision, and vibration. Lectures and homework assignments involve computer work and hands-on laboratory work in the ITLL, documented by written reports. Prereqs., MCEN 2023 and APPM 2350.

**MCEN 4043-3. System Dynamics.** Covers linear dynamic systems and mathematical tools for understanding them, input-output relationships, modeling templates, complex variables, Laplace transform, time-harmonic forcing and response, Fourier series and discrete Fourier transform, and coupled systems. Prereqs., ECEN 3010, MCEN 3022 and 3043. Restricted to senior MCEN majors.

**MCEN 4123-3. Vibration Analysis.** Highlights free and forced vibration of discrete and continuous systems. Examines Lagrange's equation, Fourier series, Laplace transforms, and matrix and computational methods. Applies knowledge to practical engineering problems. Prereq., MCEN 3030. Same as MCEN 5123.

**MCEN 4173-3. Finite Element Analysis.** Introductory course covering the theory behind and applications of the finite element method as a general and powerful tool to model a variety of phenomena in mechanical engineering. Applications include structural mechanics, mechanics of elastic continua, and heat conduction. Prereq., MCEN 2023 and 2063, or equivalents. Same as MCEN 5173.

**MCEN 4183-3. Mechanics of Composite Materials.** Introduces various kinds of composite materials, composite fabrication techniques, the physical and mechanical behavior of composites, and analytical and experimental methodologies. Prereqs., MCEN 2024 and 2063, or equivalents. Same as MCEN 5183.

**MCEN 5023-3. Solid Mechanics 1.** Introduces stress, strain, and motion of a continuous system. Discusses material derivative; fundamental laws of mass, momentum, energy, and entropy; constitutive equations and applications to elastic and plastic materials. Prereq., MCEN 2063 or equivalent; coreq., MCEN 5020 or equivalent. Similar to ASEN 5012.

**MCEN 5123-3. Theory of Vibration.** Same as MCEN 4123.

**MCEN 5173-3. Finite Element Analysis.** Same as MCEN 4173.

**MCEN 5183-3. Mechanics of Composite Materials.** Same as MCEN 4183.

**MCEN 6163-3. Elastic Waves.** Effect of transient localized sources or dislocations in an elastic medium is studied. Modeling and application of waves in rods, beams, and plates is emphasized. In addition, ultrasonic, nondestructive evaluation and seismological problems are discussed. Prereq., MCEN 5023 or equivalent. Recommended MCEN 5040 or equivalent.

**MCEN 7123-3. Dynamics of Continuous Media.** Reflects upon derivation of wave equations from the basic equations of dynamic elasticity. Topics include propagation of elastic waves in infinite and partially bounded media, Rayleigh waves and Love waves, Pochhammer solution for a rod, and waves in plates and in layered and anisotropic media. Prereq., MCEN 5020, 5040, and 5043, or equivalents. Same as PHYS 6680 and GEOL 6680.

## Materials

**MCEN 2024-3. Materials Science.** Structure, properties, and processing of metallic, polymeric, ceramic, and composite materials. Perfect and imperfect solids; phase equilibria; transformation kinetics; mechanical behavior; material degradation. Approach incorporates both materials science and materials engineering components.

**MCEN 4124-3. Mechanical Behavior of Materials.** Addresses the relationship between material structure and the fundamental processes of deformation, yield, and fracture. Examines elements of elasticity theory, introduction to plasticity, and formulation of failure criteria. Studies basic deformation processes in terms of dislocation mechanics and macroscopic mechanical behavior. Takes into consideration the influence of compositional and processing strengthening mechanisms on mechanical properties. Prereqs., MCEN 2024 and 2063.

**MCEN 4134-3. Biomechanics.** Considers the mechanical behavior of biological materials and emphasizes the relationship between structural characteristics and macroscopic behavior. Focuses first on the mechanical behavior of microscopic protein and polysaccharide elements and then on larger scale soft and hard tissue structures. Prereqs., MCEN 2024, 2063, and 3021 or equivalent. Restricted to MCEN majors and minors.

**MCEN 4174-3. Failure of Engineering Materials.** Examines the failure of materials used in engineering design through a series of real world case studies. Example failure modes considered include overload, fatigue, creep, and corrosion. Example case studies include failure of aircraft, mountaineering ropes, weight training frames, and toilets. Prereqs., MCEN 2024 and 2063. Same as MCEN 5174.

**MCEN 5024-3. Materials Science 1: Principles.** Provides a unified presentation of scientific principles applicable to all materials systems. Topics include concepts of material structure from localized interatomic bonding to short-

and long-range order in crystalline and noncrystalline solids; the nature and consequences of imperfections in solids; phase equilibria; and transformation kinetics. Considers metallic, polymeric, and ceramic materials. Prereq., MCEN 2024 or equivalent.

**MCEN 5044-3. Materials Science 2: Behavior.** Applies principles of materials science developed in MCEN 5024 to the study of physical and mechanical behavior of metals, polymers, ceramics, and their composites. Emphasizes structure-property relationships, use of primary and secondary processing steps to control material behavior, and influence of environment on in-service performance. Prereq., MCEN 5024 or equivalent.

**MCEN 5164-3. Fracture.** Focuses on basic mechanisms controlling fracture in brittle materials, reduction of capacity for plastic deformation in engineering materials used at high-strength levels, and selection of materials in terms of toughness as well as strength. Prereq., MCEN 4124 and 5044, or equivalent.

**MCEN 5174-3. Failure of Engineering Materials.** Same as MCEN 4174.

**MCEN 6184-3. Structure and Properties of Polymers.** Emphasizes the relationship between molecular structure and macroscopic properties. Structural aspects include chain conformation, configuration, and the crystalline and amorphous states. Discusses physical and mechanical properties with a focus on solution and phase behavior, transitions of bulk polymers, and rubber and viscoelastic behavior. Prereq., graduate standing and MCEN 5024 and 5044, or equivalent.

## Design

**MCEN 1025-3. Computer-Aided Design and Fabrication.** Introduces engineering design graphics. Includes learning a contemporary computer-aided design (CAD) software application and relevant engineering graphics concepts, such as orthographic projection, sections, engineering drawing practices, geometric dimensioning and tolerancing, and an introduction to manufacturing methods. Entails a final design project using rapid prototyping. Restricted to MCEN majors.

**MCEN 3025-3. Component Design.** Application of mechanics and materials science to the detailed design of various machine elements including shafts bearings, gears, brakes, springs, and fasteners. Emphasizes application and open-ended design problems. Prereq., MCEN 2063.

**MCEN 4045-3. Mechanical Engineering Design Project 1.** First part of a two-course capstone design experience in mechanical engineering. Covers problem definition, determining design requirements, alternative design concepts, engineering analysis, proof-of-concept prototype, and CAD drawings. Students make several oral design reviews, a final design presentation, and prepare a written report. Prereq., MCEN 3025. Coreq., MCEN 4026.

**MCEN 4085-4. Mechanical Engineering Design Project 2.** Second part of a two-course capstone design experience in mechanical engineering. Includes refinement of prototype, design optimization, fabrication, testing, and evaluation. Students orally present the final design and prepare a written report and operation manual for the product. Prereq., MCEN 4026 and 4045.

**MCEN 4115-3. Mechatronics and Robotics I.** Focuses on design and construction of microprocessor-controlled electro-mechanical systems. Lectures review critical circuit topics, introduce microprocessor architecture and programming, discuss sensor and actuator component selection, robotic systems, and design strategies for complex, multi-system devices. Lab work reinforces lectures and allows hands-on experience with robotic design. Students must design and build an autonomous robotic device. Project expenses may be incurred (\$50 maximum). Prereqs., ECEN 3010 or equivalent and GEEN 1300 or equivalent. Same as MCEN 5115.

**MCEN 5025-3. Computer-Aided Design of Mechanical Systems.** Instructs students in displacement, velocity, and accelerations matrix formulation of mechanisms. Emphasizes numerical methods to solve simultaneous nonlinear algebraic and differential equations modeling mechanical devices. Involves analysis and synthesis of mechanical components and systems, including planar and spatial linkages, cams, springs, shafts, and gear trains. Prereqs., MCEN 3030 or equivalent, and MCEN 3025.

**MCEN 5045-3. Design for Manufacturability.** Topics include general design guidelines for manufacturability; aspects of manufacturing processes that affect design decisions; design rules to maximize manufacturability; statistical

considerations; value engineering and design for assembly (manual, robotic, and automatic). Presents case studies of successful products exhibiting DFM. Prereq., MCEN 4026 or equivalent.

**MCEN 5115-3. Mechantronics and Robotics I.** Same as MCEN 4115.

**MCEN 5125-3. Optimal Design of Mechanical Components.** Applies linear and nonlinear optimization methods to the design of mechanical components and systems. Examines unconstrained and constrained optimization as well as formulation of objective functions, including cost, weight, response time, and deflection. Applies knowledge to gears, springs, cams, and linkages. Prereqs., MCEN 3025 and 3030 or equivalent.

## Manufacturing and Systems

**MCEN 4026-3. Manufacturing Processes and Systems.** Engineering-science design course that examines manufacturing processes for metals, polymers, and composites as well as manufacturing systems that integrate these processes. Lecture topics include: forming, machining, joining, assembling, process integration, computer-aided manufacturing, and manufacturing system engineering. Prereq., MCEN 2024.

**MCEN 5066-3. Principles and Practices of World Class Manufacturing.** Introduces manufacturing principles and practices that are essential to competing successfully in a global environment. Topics include manufacturing as a competitive tool, total quality management, process control, benchmarking, total productive maintenance, just in time, design of experiments, flexible manufacturing, and case studies.

**MCEN 5126-3. Applied Statistics for the Manufacturing and Process Industries.** Discusses the concepts and techniques of applied statistics essential to quality control and product/process improvement. Includes computer control (SQC/SPC), sampling methods and time series analysis, and methods of experimental design. Prereq., MCEN 4120. Same as CHEN 5127 and CVEN 5127.

**MCEN 5146-3. Applied Statistics in Research and Development.** Same as CHEN 5128.

**MCEN 5166-3. Electronics Packaging and Manufacturing.** To provide basic knowledge of the technologies and processes required for the packaging and manufacturing of electronic products. Topics covered include wafer fabrication, different levels of packaging, thermal management, life cycle engineering, printed wiring board assembly processes, and process control.

**MCEN 5636-3. Micro-Electro-Mechanical Systems 1.** Addresses issues of micro-electro-mechanical systems (MEMS) modeling, design, and fabrication. Emphasizes the design and fabrication of sensors and actuators due to significance of these devices in optics, medical instruments, navigation components, communications, and robotics. Prereq., instructor consent.

## Miscellaneous

**MCEN 3017-3. Circuits and Electronics.** Introductory course covers analysis of electric circuits by use of Ohm's law, network reduction, node and loop analysis, Thevenin's and Norton's theorems, DC and AC signals, transient response of simple circuits, transfer functions, basic diode and transistor circuits, and operational amplifiers. Prereqs., APPM 2360 and PHYS 1140. Same as ECEN 3010.

**MCEN 3037-2. Experimental Design and Data Analysis.** Learn to plan and carry out experiments. Coverage includes measurement fundamentals, basic statistical concepts, and uncertainty analysis. Use of statistics for the purpose of analyzing data, including regression, correlation, hypothesis testing, classification, time series analysis, and design of experiments. Prereq., APPM 2360.

**MCEN 4037-2. Measurements Lab.** Carry out several experiments designed to teach methods of experimentation and data analysis. Experiments taken from solid mechanics, fluid mechanics, thermal science, and materials science. Emphasizes planning an experiment, applying sound procedures, keeping proper records, and communicating results orally and in written reports. Gives students the opportunity to participate in projects that extend over two or more weeks. Prereq., ECEN 3010, MCEN 2063, MCEN 3037, and WRTG 3030.

**MCEN 4047-2. Mechanical Engineering Laboratory.** Carry out several experiments designed to teach methods of experimentation and data analysis.

Experiments taken from solid mechanics, fluid mechanics, thermal science, and materials science. Emphasizes planning an experiment, applying sound procedures, keeping proper records, and communicating results orally and in written reports. Gives students the opportunity to participate in projects that extend over two or more weeks. Prereq., MCEN 2024, 3022, and 4037.

**MCEN 4117-3. Anatomy and Physiology for Engineers.** Understanding human physiological function from an engineering, specifically mechanical engineering, viewpoint. Introduction to human anatomy and physiology with a focus on learning fundamental concepts and applying engineering (mass transfer, fluid dynamics, mechanics, modeling) analysis. Restricted to senior engineering majors. Same as MCEN 5117.

**MCEN 5027-1. Graduate Seminar.** Offers weekly presentations by visiting speakers, faculty, and students. May be repeated up to 6 total credit hours.

**MCEN 5117-3. Anatomy and Physiology for Engineers.** Same as MCEN 4117.

## Special Topics

**MCEN 1208 (1-3). Special Topics in Mechanical Engineering.** Subject matter to be selected from topics of current interest. Credit to be arranged. Numbered MCEN 1208-1298. Prereq., instructor consent.

**MCEN 3208 (1-3). Special Topics in Mechanical Engineering.** Subject matter to be selected from topics of current interest. Credit to be arranged. Numbered MCEN 3208-3298. Prereq., instructor consent.

**MCEN 4128-3. Special Topics.** Prereq., MCEN 4025 or equivalent.

**MCEN 4208 (1-3). Special Topics in Mechanical Engineering.** Subject matter to be selected from topics of current interest. Credit to be arranged. Numbered MCEN 4208-4298. Prereq., instructor consent.

**MCEN 4228 (1-4). Special Topics.** May be repeated up to 15 credit hours. Prereqs., MCEN 2024 and 2063. Restricted to senior MCEN majors. Same as MCEN 5228.

**MCEN 4278-3. Special Topics.** Same as MCEN 5268.

**MCEN 4848 (1-6). Independent Study.** Subjects arranged in consultation with undergraduate advisor to fit the needs of the particular student. Numbered MCEN 4848-4898. Prereq., senior standing.

**MCEN 5208 (1-4). Special Topics.** Credit hours and subject matter to be arranged. Numbered MCEN 5208-5298.

**MCEN 5228 (1-4). Special Topics.** May repeated up to 15 total credit hours. Same as MCEN 4228.

**MCEN 5248 (1-3). Special Topics.**

**MCEN 5268-3. Special Topics.** Same as MCEN 4278.

**MCEN 5848 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 5848-5898. Prereq., graduate standing.

**MCEN 5898 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 5848-5898. Prereq., graduate standing.

**MCEN 6228-3. Special Topics.**

**MCEN 6278-3. Special Topics.**

**MCEN 6848 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 6848-6898. Prereq., graduate standing.

**MCEN 6898 (1-6). Independent Study.** Available only through approval of graduate advisor. Subjects arranged to fit the needs of the particular student. Numbered MCEN 6848-6898. Prereq., graduate standing.

**MCEN 7208 (1-4). Special Topics.** Credit and subject matter to be arranged. Numbered MCEN 7208-7298.

## Thesis

**MCEN 6949 (1-3). Master's Degree Candidacy.**

**MCEN 6959 (1-6). Master's Thesis.**

## Telecommunications

**TLEN 5010-3. Network Economics and Finance I.** Examines economics as the social science discipline that examines how agents allocate scarce resources under conditions of uncertainty. Introduces a range of microeconomic principles and models used to undertake economic and financial analysis of telecommunications networks. Prereq., graduate standing.

**TLEN 5020-3. Economics of Competition Policy in Network Industries.** Develops methods to evaluate investments to account for uncertainty and dynamics. Examines approaches such as real options methodology, useful in a wide variety of applications including stock and project valuations, capital budgeting, and strategic planning. Prereq., TLEN 5010 or instructor consent.

**TLEN 5050-3. Leadership and Management.** Prereqs., TLEN 5010 or instructor consent. One year work experience is required. Same as EMEN 5050.

**TLEN 5106-3. International Telecommunications.** Institutions that affect the use of telecommunications are introduced, including various parts of the federal government such as the Department of Commerce, the FCC, and the Department of State. The major thrust of the seminar, however, is the role of international institutions, including the ITU, various satellite organizations, and the World Trade Organization. Prereq., TLEN 5010.

**TLEN 5130-3. Telecommunications Business Strategy.** Covers concepts, strategies, and practical implementation of market oriented business strategy in the telecom industry grounded with real world examples. Topics include positioning, segmentation/targeting, technology adoption, advertising/outreach, communication strategies, product management, sales process and business intelligence. Prereq., TLEN 5010.

**TLEN 5140-3. IT and Business Strategy.** Although some companies are very successful in discovering and cultivating innovative technology-enabled business strategies, many fail in the process. Combines theories and frameworks with practical approaches to provide students with the skills required to help companies identify business opportunities, find appropriate information related technologies, and lead adoption efforts to success. Prereq., TLEN 5010. Same as OPIM 4040/5040 and MGMT 4090.

**TLEN 5190-3. Standardization and Standards Wars.** Examines current issues and strategy in the standardization of telecommunications and information technologies. Covers topics on the importance of standards, government and private sector perspectives, and impact of information age technologies on standards development. Introduces students to relevance of antitrust and intellectual property law to the topic.

**TLEN 5210-2. Principles of Telecommunications Policy.** Learn the key issues and principles that guide the decisions of policymakers with respect to the regulatory treatment of voice, video, and data communications. Engage in critical debate, and develop instincts for anticipating the likely regulatory models that may be applied to new technologies. This introductory course covers technical, economic, legal, political, and institutional considerations. Prereq., TLEN 5010.

**TLEN 5230-3. Topics in Telecommunications Policy.** Provides an understanding of how telecommunications policy is developed both internationally and domestically and the framework to analyze the major policy issues in the field. May be repeated up to 6 total credit hours.

**TLEN 5240-3. Law and Regulation.** May be repeated up to 6 total credit hours. Same as LAWS 7241.

**TLEN 5260-3. Seminar: Law and Economics of the Information Age.** Examines basic regulatory and legal challenges of our information economy and digital age. Emphasizes the "networked" information industries, the proper role of "unbundling" policies to advance competition, and how intellectual property and antitrust rules should be developed. Prereq., TLEN 5240 or instructor consent required. Same as LAWS 8341.

**TLEN 5300 (1-3). Telecommunications Theory and Applications.** Examines the mathematical and physical theory of telecommunications. Deals with the fundamental concepts related to a wide range of topics including physical units, numbering systems, trigonometric functions, logarithms, indices, deci-

rels, complex numbers, calculus, elementary probability, and power circuit analysis. May be repeated up to 3 credit hours.

**TLEN 5310-3. Telecommunications Systems.** Reviews fundamental technical concepts and terminology in telecommunications. Topics of focus include: decibels, noise analysis, transmission lines, electronic signals, radio spectrum characteristics, link budgets, AM modulation, angle modulation, digital modulation, multiplexing, sampling and digital encoding, detection, and similar physical layer concepts. Systems for analysis include CATV, cellular, wireless, WLAN satellite systems, internet networking, and related voice and data networks. Prereq., TLEN 5300, or equivalent with instructor consent.

**TLEN 5330-3. Data Communications 1.** Provides a comprehensive technical survey of data and computer communications including Wireless, MAN, and WAN systems and standards. Covers interfaced, network timing and synchronization, wired and wireless LAN technologies including all aspects of Ethernet, IEEE 802 LANs, packet switching, routing, and internet design. Prereq. or coreq., TLEN 5310.

**TLEN 5340-3. VOIP Network Design.** Focuses on VOIP network design and optimization. The emphasis is on the convergence of VOIP, PSTN and cell phone networks and signaling. Topics include voice processing as well as IP and SS7 signaling. In addition there will be a review of ISDN, DSL, SONET, ATM, SIP and MPLS. There will be a case problem for sizing a VOIP network using silence suppression. Prereq., TLEN 5310.

**TLEN 5350-3. Satellite Communication Systems.** Aimed at a high level fundamental understanding of broadcasting, communication and navigation satellite systems. Topics include orbital mechanics, orbit selection, spacecraft subsystems, spacecraft and earth station configurations, propagation issues, link budgets, modulation and multiplexing techniques, multiple access schemes (FDMA, TDMA, CDMA), error control coding, satellite network architecture, and economic, regulatory and business issues in GEO, MEO, and LEO systems. Prereq., TLEN 5330.

**TLEN 5370-3. IP Routing Protocols.** Breaks IP routing technologies into two fundamental pieces: an in-depth study of interior and then exterior gateway protocols. Prereq., TLEN 5330.

**TLEN 5390-3. Applied Java Programming.** Provides a comprehensive overview of basic programming concepts, the Java programming language using an object-oriented approach, and the software development life cycle for students with little to no previous programming experience.

**TLEN 5410-3. Network Management and Operations.** Offers students a hands-on experience programatically managing network hardware and essential network services such as DHCP, DNS, ARP, FTP, Telnet, HTTP, SSH, SMTP, TFTP, and SNMP through the use of cross-platform scripting. Students with little or no programming experience will learn scripting by replicating functionality provided in common management suites such as HP OpenView, Nagios, Zennos, IBM Netview and others.

**TLEN 5430-3. Data Communications 2.** Provides a detailed technical study of Internet and Internet-related protocols following a top-down approach through the protocol stack. Bit-level analysis of a large number of Internet and Internet-related protocols, including the study of classic protocol suite principles. Covers real time and near real-time data streaming, IP mobility, IPv6, and an introduction to Internet security. Prereq., TLEN 5310, 5330 or instructor consent.

**TLEN 5440-3. Multimedia Networking.** Covers the co-evolution of traditional multimedia services (such as telephony and television) and traditional data services onto a common network infrastructure: representation and compression for speech, audio, images, and video; media transport using Real time Transport Protocol (RTP); quality of service. Prereq., CSCI 4273/5273 or TLEN 5330.

**TLEN 5460-3. Telecommunication Systems Laboratory.** Provides direct experience with telecommunications functions and equipment through experiments and demonstrations. Student teams learn the fundamental techniques of signal transmission and impairment measurement, voice and data switching, and systems administration, and the fundamental functions of data networking and services. Each experiment is designed to focus on some particular aspect of system management, development, or maintenance for either enterprise telecommunications customers or telecommunication ser-



vice providers. Procedures require the use of actual commercial equipment, services, observation, reporting of behavior, and performance, compared to specified requirements. Student teams and laboratory periods for the semester are established during the first class lecture meeting. Prereqs., TLEN 5310 and 5330. Credit not granted for this course and CSCI 4123.

**TLEN 5462-3. Advanced Telecommunications Lab.** Presents advanced networking techniques through experiments with network measurement equipment, switches, routers, and management interfaces. Each experiment focuses on some particular aspect of system management, development, or maintenance. Procedures require the use of actual commercial equipment, services, observation, reporting of behavior, and performance, compared to specified requirements. Prereq., TLEN 5460.

**TLEN 5470-3. Signaling Protocols.** Signaling in this context is the exchange of information associated with the establishment and control of a connection. Students will gain an understanding of modern signaling protocols and differences among these protocols. Students will gain an appreciation of actually implementing signaling protocols in the Internet Protocol environment. Prereqs., TLEN 5330 and C/C++. Recommended prereq., Java programming.

**TLEN 5480-3. Introduction to Optical Fiber Communications.** Provides the student with a description of optical fibers, lasers, and detectors at a level that allows them to analyze and design optical fiber communication systems. Prereq., TLEN 5310. Same as ECEN 4116.

**TLEN 5485-2. Optical Circuits Laboratory.** 2-credit hour senior level lab. Experiments cover analog and digital information transmission on free space and guided wave optical carriers. Automated data acquisition and computer analysis of data are used to investigate transmission efficacy. Same as ECEN 4696.

**TLEN 5490-3. Network Programming.** Exposes students to UNIX/Linux systems and network programming with an emphasis on practical programming problems and experience. Covers the unique challenges of programming distributed systems including resolving synchronization, threads, pipes, sockets, and other constructs for building TCP/IP network servers and clients.

**TLEN 5510-3. Wireless and Cellular Communications.** Presents in detail the technologies and architectures employed in cellular and other modern wireless systems and discusses regulatory and other industry issues. Major topics include radio technology, multiple access techniques, analog and digital cellular telephony, and personal communications systems. Prereq., TLEN 5310 or instructor consent.

**TLEN 5520-3. Wireless Local Area Networks.** Examines small-scale wireless networks particularly personal and local area networks. Covers licensed and unlicensed spectrum, indoor and small-scale radio propagation, modulation techniques, network topologies, ad hoc and infrastructure networks, protocol design, TCP/IP-wireless interactions, and protocol standards. Prereq., TLEN 5330. Recommended prereq., TLEN 5430.

**TLEN 5530-3. Applied Network Security.** Examines the critical aspects of network security. A technical discussion of threats, vulnerabilities, detection, and prevention is presented. Issues addressed are cryptography, firewalls, network protocols, intrusion detection, security architecture, security policy, forensic investigation, privacy, and the law. Prereq., TLEN 5330.

**TLEN 6321-3. Computer Crime.** Explores the legal issues that judges, legislators, prosecutors, and defense attorneys are confronting as they respond to the recent explosion in computer-related crime. Includes the Fourth Amendment in cyberspace, the law of electronic surveillance, computer hacking and other computer crimes, encryption, online economic espionage, cyberterrorism, First Amendment in cyberspace, federal/state relations in the enforcement of computer crime laws, and civil liberties online. Same as LAWS 6321.

**TLEN 5540-3. Network Security Laboratory.** Applies what students have learned in computer and network security foundations in a simulated network environment. Topics to be covered include: system hardening, firewalls, intrusion detection, vulnerability assessment, and investigation. Prereqs., TLEN 5530. Recommended prereq., operating system experience. Credit not granted for this course and CSCI 4133.

**TLEN 5550-3. Computer and Network Security.** Studies methods to protect information, and the ability to process and move information, from theft, misuse, tampering, destruction, and unauthorized access. Introduces foundational topics of computer and network security, including security models, cryptography, and authentication protocols. Prereqs., significant experience in coding (C or C++); some experience in networks; familiarity with TCP/IP, UDP, and ICMP. Recommended prereq., CSCI 5273. Same as CSCI 6268.

**TLEN 5560-3. Wireless Systems Laboratory.** Serves as hands-on exploration of wireless communication systems. The course is designed to complement TLEN 5510 and TLEN 5520 by taking several subjects to greater depth. Students will work with and in some cases build radio frequency test equipment, transmitters, receivers, antennas, and wireless communication systems. Coreq., TLEN 5510 or 5520.

**TLEN 5570-3. IP Network Design.** Implement fundamentals of IP Routing Protocols and apply them directly to design based networking problems. Design scenarios will incorporate physical and logical design, financial analysis, and laboratory configuration. Prereq., TLEN 5370.

**TLEN 5600-1. Telecommunications Seminar.** Provides a series of weekly lectures with questions and discussion. Many of the speakers are nationally known experts in telecommunications. Fall and spring seminars are for 1 credit hour each, and attendance is required.

**TLEN 5700-1. Capstone 1.** Develop basic concepts and methods for pursuing quantitative and qualitative research. Capstone teams will be formed and students will begin work on research projects that will be completed in TLEN 5710 Capstone 2. Capstone 1 and 2 must be taken in sequential semesters. Enrollment requires 14 completed credit hours in ITP: 6-technical; 6-non-technical; 2-seminar. Writing skills test required.

**TLEN 5710 (1-2). Capstone 2.** Complete Capstone research project initiated in TLEN 5700 Capstone 1.

**TLEN 5900-3. Research Techniques in Engineering Management.** Same as EMEN 5900.

**TLEN 5830 (1-6). SPECIAL TOPICS.**

**TLEN 5831-5839 (3). Special Topics.**

**TLEN 5920 (1-6). Independent Study.**

**TLEN 6940 (1-3). Candidate for Degree.**

**TLEN 6950-6. Master's Thesis.**

**TLEN 6960-3. Telecommunications Project.**

# School of Journalism and Mass Communication

## Core Curriculum and General Electives

**JOUR 1001-3. Contemporary Mass Media.** Examines mass media's interaction with society and looks at journalism and mass media in historical, intellectual, economic, political, and social contexts.

**JOUR 1871 (1-3). Special Topics.**

**JOUR 2011-3. Media and Public Culture.** Introduces the rise and development of mediated communication and its impact on and role within the formation of modern culture and public life. Restricted to JOUR majors.

**JOUR 2601-3. Principles of Journalism.** Provides an overview of the professional traditions, roles, practices and responsibilities of news media in a democracy. Covers best journalistic practices, how news is defined, truth telling, ethics, reporting and writing in a diverse society, emerging trends and new sources of news, and how business concerns impact the practice of journalism. Promotes the highest professional values and encourages students to be future leaders who recognize the possibilities of journalism in a democratic society. Restricted to majors.

**JOUR 3001-3. Public Affairs Reporting.** Grounds students in basic reporting and writing skills necessary to become competent journalists. Prereq., JOUR 2601. Restricted to juniors/seniors. May be limited to majors.

**JOUR 3771-3. Mass Communication History.** Discusses major trends in the development of contemporary American journalism, its role in United States history, famous journalists, and foundations and evolution of freedom of the press. Prereq., junior or senior standing. May be limited to majors.

**JOUR 4201-3. International Mass Communication.** Covers mass media in the international system, including comparative examinations of national and international press organizations, methods, and content. Also looks at the role of mass media in developed and developing countries and the international flow of news and opinion.

**JOUR 4301-3. Media Ethics and Professional Practice.** Provides a theoretical framework within which to spot and analyze ethical issues in the mass media. Awakens students to ethical issues; allows them to question the profession's conventional wisdom; and teaches them how to change those conventions. Same as JOUR 5301. Restricted to junior/senior JOUR students.

**JOUR 4311-3. Mass Communication Criticism.** Introduces students to the critical perspectives most often employed in qualitative media analysis: semiology, structuralism, Marxism, psychoanalytical criticism, sociological criticism, etc. Texts from contemporary print and broadcast media.

**JOUR 4321-3. Media Institutions and Economics.** Introduces the institutions and practices of the media industries. Surveys the histories, structures, and activities of these organizations and the contemporary issues surrounding them. Restricted to JOUR majors with a minimum of 73 hours. Same as ETHN 4324 and JOUR 5321.

**JOUR 4331-3. Women and Popular Culture.** Studies how women are portrayed in mass media, particularly advertising, television, film, and contemporary popular literature. Uses critical methods with a focus on producing responsible viewers and readers. Same as JOUR 5331, WMST 4331.

**JOUR 4341-3. Global Media.** Examines the ownership of major media, the nature of advertising, the business process outsourcing the Internet enables, news and the entertainment content media provide. Presents an understanding of global/national/local tussles, embedded in history, economics, politics and culture.

**JOUR 4651-3. Mass Communication Law.** Studies state and federal laws and court decisions that affect mass communication in order to develop knowledge of mass media rights and responsibilities and an understanding of the legal system.

**JOUR 4661-3. Newspaper Management.** Covers management and organization of newspapers, including an understanding of daily management considerations and what is involved in being an employee in today's newspaper environment. Same as JOUR 5661.

**JOUR 4711-3. Mass Media and Culture.** Examines culture in the form of discourse, symbols, and texts transmitted through mass media. Explores the relationship between such mediated culture and social myth and ideology. Same as JOUR 5711.

**JOUR 4791-3. Mass Communication and Public Opinion.** Topics include opinion-shaping role of the mass media, theories of public opinion and propaganda, polling, communication effects, and communication theories. Same as JOUR 5791.

**JOUR 4831-3. Publication Design and Production.** Explores fundamentals of design, typography, composition, color, and print media, with an emphasis on both the design process and presentation comps. The focus is on the design of niche and consumer audience publications, such as newsletters, magazines, and collateral print. May be limited to majors. Same as JOUR 5831.

**JOUR 4841 (1-3). Undergraduate Independent Study.**

**JOUR 4871 (1-3). Special Topics.**

**JOUR 4931 (1-6). Internship.**

**JOUR 5001 (1-4). Research in Journalism.** Offers students the opportunity to participate in research projects with faculty members or pursue their own primary research interests.

**JOUR 5201-3. International Mass Communication.** Same as JOUR 4201.

**JOUR 5301-3. Media Ethics and Professional Practice.** Same as JOUR 4301.

**JOUR 5321-3. Media Institutions and Economics.** Same as JOUR 4321.

**JOUR 5331-3. Women and Popular Culture.** Same as JOUR 4331.

**JOUR 5511-3. Newsgathering 1.** Covers problems and practice in reporting news of government, politics, the courts, and industry, business, science, and other areas involving public issues. For graduate students only.

**JOUR 5521-3. Precision Journalism.** Instructs students in computer-assisted reporting, including a knowledge of commercial databases, global information networks, and the use of spreadsheets to analyze census data and other complex information.

**JOUR 5651-3. Mass Communication Law.** Studies state and federal laws and court decisions that affect mass communication in order to develop knowledge of mass media rights and responsibilities and an understanding of the legal system.

**JOUR 5661-3. Newspaper Management.** Same as JOUR 4661.

**JOUR 5711-3. Mass Media and Culture.** Same as JOUR 4711.

**JOUR 5791-3. Mass Communication and Public Opinion.** Same as JOUR 4791.

**JOUR 5831-3. Publication Design and Production.** Same as JOUR 4831.

**JOUR 5841 (1-3). Graduate Independent Study.**

**JOUR 5851 (1-6). Graduate Professional Project.**

**JOUR 5861-3. Visual Communication.** Visual communication involves understanding both perception of messages and construction of them. Students analyze their visual thinking abilities and develop habits of visual analysis and criticism, as well as visual communication skills.

**JOUR 5871 (1-3). Special Topics.**

**JOUR 5931 (1-3). Internship.**

**JOUR 6051-3. Theories of Mass Communication.** Studies theories and perspectives of mass communication and explores the role of mass media in society.

**JOUR 6061-3. Mass Communication Research.** Continuation of JOUR 6051, emphasizing experimental and survey research methods.

**JOUR 6071-3. Critical Theories of Media and Culture.** Introduction to critical theories and analysis of media and popular culture. Examines major theoretical traditions and/or theorists that significantly inform media studies (e.g., culturalism, structuralism, Marxism, critical theory, feminism, psychoanalysis, post-structuralism) and applies these to media analysis and criticism.

**JOUR 6201-3. Readings in International Mass Communication.** Covers mass communication within the international system, including similarities and dif-

ferences in functions, facilities, and content; social theories of the press; and the international flow of mass communication.

**JOUR 6211-3. Communication and International Development.** Studies and analyzes communications technologies and techniques used in addressing social problems in developing countries.

**JOUR 6301-3. Communication, Media, and Concepts of the Public.** Introduces students to historical and contemporary uses of fundamental concepts in research and theory about media institutions, particularly public, community, mass, publicity, public space, public opinion, public interest, and the public sphere.

**JOUR 6311-3. Seminar: Freedom of Expression.** Studies free-speech issues in the context of current and historical philosophical foundations for freedom of expression.

**JOUR 6321-3. Literary Journalism.** Analyzes the work of journalists who became some of the greatest fiction writers of the 19th and 20th centuries, and examines the increasingly indistinct lines between journalism and narrative fiction.

**JOUR 6331-3. Political Communication.** Explores the dynamic relationships involving media and politics, focusing primarily on the American political system. Readings and seminar discussion incorporate normative and empirical perspectives on the media-politics complex. Areas covered include media effects on public opinion and policy, uses of media in governance, journalism sociology, coverage of elections, and implications of interactive media for governance and civic participation.

**JOUR 6341-3. Children and the Media.** Examining the concepts of children and childhood from the historical, social, cultural, economic and political perspectives, this course explores the interaction between mass media and the socialization and cultivation process of children and youth. Many theoretical traditions are used as a framework to study a variety of issues, such as multicultural literature for children and Disney's role in storytelling, and tween movies and the tweens.

**JOUR 6551-3. Telecommunication Policy.** Surveys historical and contemporary developments in telecommunications policy, emphasizing social and cultural dimensions, and focusing primarily on the context of the United States.

**JOUR 6651-3. Media Law.** Graduate seminar in communications law. Studies changing law and applied legal research techniques.

**JOUR 6661-3. Media Ethics and Responsibility.** Develops a theoretical framework with which to recognize and analyze ethical issues as they arise in the mass media.

**JOUR 6671-3. Media, Myth, and Ritual.** Anthropological and interpretative exploration of cultural practices of media audiences. Addresses theoretical and methodological implications of studying audiences from a culturalist perspective, with particular focus on media audience practices. Students engage in field research projects related to course content.

**JOUR 6711-3. Mass Communication, Culture.** Inquiry into relationship of the arts and the mass media, including study of critics, their function, and their works.

**JOUR 6721-3. Message Effectiveness.** Investigates how mass media messages work in terms of such effects as perception, learning and comprehension, and persuasion. Effectiveness is analyzed in terms of how well mass communication messages meet their objectives.

**JOUR 6771-3. History of Mass Communication.** Examines specialized areas in the history of mass communication.

**JOUR 6781-3. Economic and Political Aspects of Mass Communication.** Discusses economic problems and political issues relevant to newspapers, magazines, broadcasting, and CATV. Examines problems of telecommunications and the impact of future technology on mass communication.

**JOUR 6951 (1-6). Master's Thesis.**

**JOUR 7011-3. Proseminar in Communication Theory 1.** Introduces the principal concepts, literature, and theoretical and paradigmatic perspectives of media studies and mass communication and their ties and contributions to parallel domains in the social sciences and humanities.

**JOUR 7021-3. Proseminar in Communication Theory 2.** Continuation of JOUR 7011. Prereq., JOUR 7011.

**JOUR 7051-3. Qualitative Research Methods in Mass Communication.** Examines various methods of qualitative data gathering and analysis in the mass media context.

**JOUR 7061-3. Quantitative Research Methods in Mass Communication.** Examines various methods of quantitative data gathering methods and analysis in the mass media context.

**JOUR 7871-3. Special Topics.**

**JOUR 8991 (1-10). Doctoral Thesis.**

## News-Editorial

**JOUR 3102-3. Press Photography.** Covers the camera as a reporting tool, training in the use of cameras, composition, and darkroom procedures. Prereq., JOUR 2601 or 2403. May be limited to majors.

**JOUR 3552-3. News Editing.** Discusses principles and practice in copy editing and writing headlines for local and wire stories. Practice in page makeup, picture editing, and electronic editing. Prereq., JOUR 3001. Restricted to majors.

**JOUR 3902 (1-3). Newspaper Practicum.** Gives students the opportunity to participate in news work on Campus Press. May be repeated up to 6 total credit hours.

**JOUR 4002-3. Reporting 2.** Assumes mastery of basic reporting and writing skills. Students produce more sophisticated stories on a variety of topics. Prereq., JOUR 3001. Restricted to junior/senior NSED and JOUR students.

**JOUR 4102-3. Advanced Photography.** Explores advanced camera and darkroom techniques, the picture story, picture editing, trends in pictorial journalism, and individual projects. Prereq., JOUR 3102. Same as JOUR 5102.

**JOUR 4272-3. Public Relations.** Surveys public relations in America. Includes case studies and individual projects. Same as JOUR 5272.

**JOUR 4282-3. Public Relations Programs.** Develops and applies public relations programs, from identification of the problem through execution of public relations techniques. Prereq., JOUR 4272. Restricted to senior NSED majors. Same as JOUR 5282.

**JOUR 4502-3. Reporting 3.** Involves writing news and features about actual events for publication under deadline pressure. Lab to be arranged. Prereqs., JOUR 3552 and 4002, and senior standing. Restricted to majors. Same as JOUR 5502.

**JOUR 4552 (1-3). Advanced Editing.** Highlights copy editing, headline writing, page designing, and news evaluating. Emphasizes day-to-day newsroom operations in a newsroom environment. Students edit the *Campus Press*.

**JOUR 4562-3. Electronic Journalism.** Involves studying and writing about existing electronic publications and online publishing policies. Teaches methods of electronic journalism from simple text to the more sophisticated graphics, photos, movies, and sound and text presentations. Same as JOUR 5562.

**JOUR 4602-3. Editorial and Opinion Writing.** Concentrates on several of the subjective areas of journalism. Emphasizes editorial writing, editorial pages, critics, and criticism of the performing arts. Same as JOUR 5602.

**JOUR 4702-3. Critical Writing for the Journalist.** Analyzes the entertainment area, especially as it pertains to the print media. Emphasizes the composition of criticism and attitudes and writing techniques of individual critics. Prereq., JOUR 3001. Same as JOUR 5702.

**JOUR 4802-3. Magazine and Feature Writing.** Provides practice in writing freelance articles. Considers types, sources, methods, titles, illustrations, and marketing. Prereq., JOUR 3001. Same as JOUR 5802.

**JOUR 4822-3. Reporting on the Environment.** Involves reporting and writing about the environment by taking into account the scientific, technological, political, economic, and cultural dimensions of environmental subjects. Same as JOUR 5822.

**JOUR 4872 (1-3). Special Topics: Print.** Same as JOUR 5872.

**JOUR 5102-3. Advanced Photography.** Same as JOUR 4102.

**JOUR 5272-3. Introduction to Public Relations.** Same as JOUR 4272.

**JOUR 5282-3. Public Relations Programs.** Prereq., JOUR 5272 or instructor consent. Same as JOUR 4282.

**JOUR 5502-3. Newsgathering 2.** Prereqs., JOUR 5511 and 5552. Restricted to majors. Same as JOUR 4502.

**JOUR 5512-3. In-Depth Reporting.** Shows how to dig beneath the surface of issues and events. Focuses on research, interviewing, and writing. Prereq., JOUR 5511.

**JOUR 5552-3. News Editing.** Discusses principles and practice in copy editing and writing headlines for local and wire stories. Practice in page makeup, picture editing, and electronic editing. Prereq., JOUR 3001. Restricted to majors.

**JOUR 5562-3. Electronic Journalism.** Same as JOUR 4562.

**JOUR 5602-3. Editorial and Opinion Writing.** Same as JOUR 4602.

**JOUR 5702-3. Critical Writing for the Journalist.** Same as JOUR 4702.

**JOUR 5802-3. Magazine and Feature Writing.** Prereq., JOUR 5511. Same as JOUR 4802.

**JOUR 5812-3. Science Writing.** Helps students acquire the basic skills and knowledge required of science journalists. Also examines issues of scientific importance such as climate change, the nature of scientific knowledge, and how science is communicated in various media.

**JOUR 5822-3. Reporting on the Environment.** Same as JOUR 4822.

**JOUR 5872 (1-3). Special Topics: Print.** Same as JOUR 4872.

## Advertising

**JOUR 2403-3. Principles of Advertising.** Covers basic principles of publication, radio, and television advertising. Analyzes consumers, markets, and media. Organizes advertising departments and agencies.

**JOUR 3403-3. Branding and Positioning.** Provides students with the opportunity to work through the strategic communication planning process from situation analysis through communication objectives. Prereq., JOUR 2403. Restricted to ADVT, MKTG majors.

**JOUR 3453-3. Introduction to Creative Concepts.** Provides experience in creating advertising copy and layout and analyzing consumer and product appeals. Students prepare copy for various media: newspapers, magazines, radio, and television. Prereq., JOUR 2403. Restricted to ADVT and MKTG majors.

**JOUR 3463-3. Advertising Media.** Studies media, markets, and audiences, and their relationships to advertising messages. Prereqs., JOUR 3403 and 3453. Restricted to junior/senior ADVT and MKTG majors.

**JOUR 3473-3. Advertising Research.** Introduces students to applied research methods and provides practice in using research in marketing and advertising decision making. Prereqs., JOUR 3403 and 3453. Restricted to junior/senior JOUR, MKTG and ADVT majors.

**JOUR 3503-3. Intermediate Creative Concepts.** Provides experience in how to develop concepts large enough to be the basis of a multi-ad campaign. Learn how to give individual ads in each campaign a consistent look and tone. Prereq., JOUR 3403, 3453, and instructor consent.

**JOUR 3913 (1-3). Advertising Practicum.** Provides the opportunity to do advertising work for the Campus Press and the virtual mall. May be repeated up to 6 total credit hours.

**JOUR 4403-4. Advertising Campaigns.** Course in which students conduct research, develop strategic directions and creative concepts for a integrated advertising campaign for national and regional audiences. Prereq., JOUR 3463 or 3503. Restricted to ADVT and MKTG majors with a minimum of 85 hours.

**JOUR 4453-3. Advertising and Society.** Examines criticisms and contributions of advertising in society and the economy. Same as JOUR 5453.

**JOUR 4503-3. Advanced Creative Concepts.** Shows how to apply skills learned in JOUR 3503 to specific product areas. Learn how to extend a campaign idea across various media. Portfolios are developed with a range of products for a variety of print media venues. Prereqs., JOUR 3503 and 4513.

**JOUR 4513-3. Introduction to Art Direction.** Helps students strengthen their understanding of design and type. Emphasis is also placed on the visual imagination and helping students learn to use images to express their ideas. Prereqs., JOUR 3403, 3453 or instructor consent. Coreq., JOUR 3503.

**JOUR 4523-3. Portfolio.** Develop new campaigns; select, edit, and fine tune ideas with the most portfolio potential; and execute work on computer until each campaign has the finished quality of professional work. Students complete portfolios. Prereq., JOUR 4503 or instructor consent.

**JOUR 4533-3. Consumer Insights.** Uses qualitative research to understand how the world looks from the consumer's point of view. Prereqs., JOUR 3403, 3453. Restricted to ADVT, MKTG majors.

**JOUR 4543-3. Strategic Brand Management.** Examines the theory of branding: what brands are, how brands are created and measured, as well as strategies for managing brands and brand communication. Prereq., JOUR 3463. Restricted to ADVT, MKTG majors.

**JOUR 4873(1-3). Special Topics.** Prereqs., JOUR 3453, 3463, and 3473.

**JOUR 5453-3. Advertising and Society.** Same as JOUR 4453.

**JOUR 5873-3. Special Topics: Advertising.**

## Broadcast

**JOUR 3604-3. Radio and Television News.** Covers principles and techniques involved in the preparation of news for broadcasting. Prereq., JOUR 2601. Restricted to junior/senior majors.

**JOUR 3614-3. Radio Programming and Production.** Introduces audio console, microphones, turntables, tape recorders, tape editing, timing, and combo operation. Emphasizes applying the basic principles to professional production of radio programs.

**JOUR 3644-3. Principles of Broadcast Production.** Introduces the use of television equipment. Emphasizes applying the basic principles to professional program production. Prereq., JOUR 2601. Restricted to junior/senior BCPM/BCNS majors.

**JOUR 3674-3. Television Production 2.** Covers studio productions for *NewsTeam Boulder*. Students also do field projects to sharpen their writing, video production, and editing skills. Prereq., JOUR 3644.

**JOUR 4344-3. TV Documentary.** Designed to give advanced broadcast students the opportunity to create through research, writing, videotaping, and editing a long-form, nonfiction television program. Prereq., JOUR 3644. Same as JOUR 5344.

**JOUR 4354-3. TV Reporting.** Students learn basic broadcast reporting skills—where to find news and how to cover it, how to analyze and organize news stories. Skills are linked with advanced concepts of shooting and editing videotape in order to produce news stories on deadline. Prereqs., JOUR 3604 and 3644.

**JOUR 4614 (1-3). Advanced Radio Practices.** Applies the theory of radio programming and production. Assignments include producing radio programming for radio stations in Colorado and weekly discussion-critique sessions. Prereq., JOUR 3614. Same as JOUR 5344.

**JOUR 4624-3. NewsTeam.** Students participate in *NewsTeam Boulder* a program broadcast live over the Boulder cable television system. Prereq., JOUR 4354. Restricted to senior BCNS majors. Same as JOUR 5624.

**JOUR 4634 (1-3). Broadcast Projects.** Covers interpretation, preparation, and/or reporting in programs for broadcast media. Prepares radio or television documentaries and informational/entertainment programs. Prereqs., JOUR 3604 and 3644, or instructor consent.

**JOUR 4644-3. Electronic Media Management.** Analyzes station operations, public relations, personnel, financing, labor relations, and laws and regulations as well as the manager's ethical and social responsibilities. Same as JOUR 5644.

**JOUR 4674 (1-3). Television Production 3.** Provides in-depth experience in directing and producing television programs. Prereq., JOUR 3674.

**JOUR 5344-3. TV Documentary.** Same as JOUR 4344.

**JOUR 5514-3. Newsgathering for Television.** Covers principles and techniques involved in the preparation of news for broadcasting. Introduces the use of television equipment.

**JOUR 5524-3. Television Investigative Reporting.** Covers how to produce quality, substantive, in-depth stories for television. Covers the basics of investigative reporting, research, and working with sources.

**JOUR 5624-3. NewsTeam.** Prereqs., JOUR 5511 and 5514. Same as JOUR 4624.

**JOUR 5634 (1-3). Broadcast Projects.** Prereq., instructor consent. Same as JOUR 4634.

**JOUR 5644-3. Electronic Media Management.** Same as JOUR 4644.

**JOUR 5874 (1-3). Special Topics: Electronic Media.**

**JOUR 6940-3. Master's Degree Candidate.**

## Law School

### Business

**LAWS 5121-3. Contracts.** Covers basic principles of contract liability, offer, acceptance and consideration, statute of frauds, contract remedies, the parole evidence rule, performance of contracts, conditions, effect of changed circumstances, third-party beneficiaries, assignment, and specific performance.

**LAWS 6011-3. Payment Systems.** Examines the methodology and policies of Articles 3 and 4 of the Uniform Commercial Code, dealing with such topics as negotiable instruments, bank deposits, collections, letters of credit, and electronic fund transfers.

**LAWS 6021-3. Secured Transactions.** Explores the methodology and policies of Article 9 of the Uniform Commercial Code, dealing with financing transactions in personal property.

**LAWS 6201 (3-4). Agency, Partnership, and the LLC.** Surveys agency law whose principles are important in many other areas of law. Studies the legal organizations commonly used by small businesses: partnerships and limited liability companies (LLCs).

**LAWS 6211-3. Corporations.** Covers formation of corporations and their management; relations among shareholders, officers, and directors; the impact of federal legislation on directors' duties; and the special problems of closed corporations.

**LAWS 6281-3. Accounting Issues for Lawyers.** Studies accounting and auditing problems in the form they are placed before the lawyer, including a succinct study of basic bookkeeping, in-depth legal analysis of the major current problems of financial accounting, and consideration of the conduct of the financial affairs of business.

**LAWS 6511-3. Labor Law.** Includes the subjects of evolution of labor relations laws; how a collective bargaining relationship is established; negotiation of the collective bargaining agreement; labor and the antitrust laws; and rights of the individual worker. Course materials frame the issue of how a developed or postindustrial democracy deals with the problems that arise out of the employment relationship: of the choices between laissez-faire, substantive regulation, and the private ordering of the employment relationship through the collective bargaining process.

**LAWS 6521-3. Employment Law.** Entails a survey of employment-at-will, workplace safety, workplace torts; ERISA and retirement, workers' compensation; controls on hours and wages; health insurance; disability and unemployment compensation.

**LAWS 7011-3. Creditors' Remedies and Debtors' Protection.** Examines typical state rights and procedures for the enforcement of claims and federal and state law limitations providing protection to debtors in the process. Includes prejudgment remedies, statutory and equitable remedies, fraudulent conveyance principles, and exemptions and other judicial protections afforded debtors.

**LAWS 7021-3. Bankruptcy.** Briefly examines nonbankruptcy business rehabilitation devices, followed by basic principles of federal bankruptcy law and the bankruptcy court system. Concludes with attention to business reorganizations under Chapter 11 of the Bankruptcy Code. Recommended prereq., LAWS 6001 and 7011.

**LAWS 7101-4. Deals.** Explores the business lawyer's role in creating value by helping clients identify, assess, and manage business risks through efficient contract design while achieving the optimal legal, tax or regulatory treatment for the deal. Includes case studies of actual transactions.

**LAWS 7111-3. Contract Theory.** Explores various contract theories and principles emanating from classical and neoclassical law, legal realism, law and economics, critical legal studies, law and society, relational theory, and others. Considers and critiques these theories as applied to particular contracting cultures, especially as applied to construction contracts.

**LAWS 7121-3. Advanced Contracts: Commercial Transactions.** Studies Article 2 and Article 2A of the Uniform Commercial Code, together with the Convention and the International Sale of Goods. Advanced contracts topics

are explored in depth. Among other subjects, warranties, title, remedies, and risk of loss in the sale of lease of goods will be studied.

**LAWS 7201-3. Antitrust.** Studies American competition policy: collaborations among competitors, including agreements on price and boycotts, definition of agreement, monopolization, vertical restraints such as resale price maintenance, and territorial confinement of dealers. Offered in alternate years.

**LAWS 7211-3. Business Planning.** Focuses on the development and use of concepts derived from a number of legal areas in the context of business planning and counseling. Topics such as formation of business entities, sale of a business, recapitalization, division, reorganization, and dissolution are considered. Prereqs., LAWS 6007, 6201, and 6251 or 6211.

**LAWS 7221 (2-3). Government Regulation of Business.** Covers themes that explore the nature of the regulatory state and the realities of how businesses react to regulation. Provides an understanding of regulatory institutions; the tools of governmental regulation; and a critical perspective on regulation.

**LAWS 7261-3. Corporate Finance.** Examines a variety of important legal issues related to the funding and financing corporations including creditor protection laws, the Trust Indenture Act of 1939, fiduciary duties, bond indenture provisions, securities laws, and rights of equity holders. Covers efficient capitalization structures, corporated valuation techniques, capital markets and the efficient market theory, and cost of capital concept. Prereq., LAWS 6211 or 6251.

**LAWS 7271-3. Venture Capital and Private Equity.** Provides overview of the legal and financial principles to represent privately held companies, their founders and managers, and their investors. Emphasizes transaction structuring rather than judicial opinions. Includes the organization and financing of start-ups, structuring buyout transactions, exit strategies, legal organization of investment funds and other financial intermediaries. Discusses the relevant regulatory landscape, including securities law, bankruptcy, ERISA, and tax law.

**LAWS 7331-2. Sports Law.** Covers the application of rules from agency, anti-trust, contracts, constitutional law (including sex discrimination), labor law, property, torts, unincorporated associations, and other subjects to those persons involved in the production and delivery of athletic competition to consumers. Explores the development of the application of these rules to a sports setting and related economic issues.

**LAWS 7401-3. Securities Regulation.** Stresses statutory interpretation of the various federal statutes regulating the issue of corporate securities and the cases and regulations that have arisen out of those statutes.

**LAWS 7411-3. Mergers, Acquisitions, and Reorganizations.** Studies the planning of corporate mergers, acquisitions, and reorganizations, examining the application and integration of state corporate law, federal securities law, accounting principles, tax law, labor law, products liability law, environmental law, ERISA, and antitrust law.

**LAWS 7451-3. Law and Finance for Entrepreneurs.** Studies unique legal problems faced by entrepreneurs, including formation issues (choice of entity, rights of the founders, initial investors), operation issues (governance, key employees, intellectual property, financing), IPOs, and buy-outs.

**LAWS 7541-3. Employment Discrimination.** Examines statutory and constitutional prohibitions of discrimination in employment on the basis of race, gender, age, religion, national origin, and disability.

**LAWS 7601-3. Business Transactions.** Provides a practical understanding of how to apply the law in both transactional and litigation settings. Gives an interdisciplinary look at how various areas of the law are brought together in common factual settings. Teaches students to negotiate, document, and close the acquisition of a business covering the areas of practice of corporate, contracts, real property, secured transactions, and bankruptcy law. Tests, in a litigation setting, the decisions made during the acquisition stage.

**LAWS 8021-3. Seminar: Consumer Empowerment.** Considers contract theories and principles emanating from classical and neoclassical law, legal realism, law and economics, and critical legal studies. Explores and questions tensions among theories, focusing on how they interact with norms, goals, and functions of contract and consumer protection law. Observes these tensions "in action" through volunteer work with Heritage House, a home for

young women who are "at risk" and cannot live with their families at this time for different reasons.

**LAWS 8351-2. Seminar: Law and Economics of Utility Regulation.** Discusses economics of regulation and matters ranging from neoclassical economic analysis to public choice theory to new institutional economics. Discusses several regulatory domains, including antitrust law, telecommunications regulation, and energy regulation. Highlights both economic and non-economic goals, including universal service, sustainability (e.g., renewable energy), and architecture (e.g., free speech concerns with regard to telecommunications networks). Prereqs., LAW 6301 or 7201 or 7241 or TLEN 5835. Restricted to LAW and TLEN students.

**LAWS 8401-2. Seminar: Securities Litigation and Enforcement.** Designed for students interested in studying topics related to securities litigation. Covers civil liability under the Securities Act of 1933, proxy fraud, class actions (with special emphasis on the Private Securities Litigation Reform Act and the Securities Litigation Uniform Standards Act), market manipulation, SEC enforcement actions, enforcement issues involving attorneys and accountants, criminal enforcement, international securities fraud, and securities arbitration.

**LAWS 8521-2. Seminar: Comparative Labor Law.** Explores the laws and economic transformations that affect labor relations on a global scale.

**LAWS 8701-2. Seminar: Counseling Families in Business.** Explores the legal aspects of owning, managing, and participating in a successful family business system, including corporate structure, legal issues, succession planning and estate management, internal capital markets in private enterprise, ownership issues in private businesses, how lawyers can assist with family governance, planning for and managing family philanthropy, gender issues in family business, and conflict resolution. Recommended prereqs., LAWS 6104, 6157, 6211, and/or 7409.

## Environment, Natural Resources, and American Indian

**LAWS 6002-3. Public Land Law.** Deals with the legal status and management of resources on federal lands, including national forests, parks, and BLM lands. Explores federal law, policy, and agency practice affecting the use of mineral, timber, range, water, wildlife, and wilderness resources on public lands. Prereq., LAWS 6112.

**LAWS 6112-3. Foundations of Natural Resources Law and Policy.** Introduces students to the law of natural resources. Examines the legal, historical, political, and intellectual influences that shape resources development and conservation. Same as ENVS 6112.

**LAWS 6302-3. Water Law.** Analyzes regional and national water problems, including the legal methods by which surface and ground water supplies are allocated, managed, and protected.

**LAWS 6502-2. Wildlife and the Law.** Examines the law that protects wildlife, its habitat, and biodiversity. Explores human-caused threats including habitat destruction, illegal trade, and climate change. Focuses on statutes, case law, environmental ethics, and current controversies to highlight legal, scientific, and political strategies for protecting biodiversity. Particular emphasis is placed on the U.S. Endangered Species Act.

**LAWS 6712-3. Climate Change Law and Policy.** Examines the science of climate change and the broader role of science in public policymaking. Reviews the changing legal landscape to abate greenhouse gas emissions, and key issues in policy design. Reviews the Supreme Court's April 2, 2007, decision in *Massachusetts v. EPA*, overturning EPA's refusal to regulate greenhouse gas pollution from motor vehicle tailpipes, and the aftermath in the courts, Executive Branch, and Congress.

**LAWS 6722-3. Energy Law and Regulation.** Provides an introduction to energy law and regulation in the United States. Covers basic principles of rate regulation and public utilities, the division of jurisdiction between federal and state governments, and the key federal statutes and regulatory regimes governing natural gas, electricity, and nuclear power. Focuses on the basic federal frameworks for natural gas and electricity regulation, with an emphasis on understanding the messy and uneven transition to wholesale competition in these sectors and, in the electricity context, the experience with state restructuring and retail competition.

**LAWS 7102-3. Oil and Gas.** Deals with the legal problems associated with private arrangements for the ownership and development of oil and gas: deeds and leases to oil and gas rights, trespass, adverse possession, implied covenants in leases, conveyances of fractional interests, and the interaction of private rights and conservation regulation.

**LAWS 7122 (2-3). Mining and Energy Law.** Addresses major issues affecting the development of mineral resources through mining activity. Includes the regulation of the impacts of mining on the environment on both public and private land. Covers the Mining Law of 1872, the Federal Coal Leasing Amendments, and state regulation of the impacts of mining on the environment.

**LAWS 7132-3. Energy Insecurity and Sustainable Energy.** Examines why national security deals not only with armed aggression and the ability to thwart military invasions or subversion, but also includes critical threats to vital national and international support systems such as the economy, energy, and the environment.

**LAWS 7202-3. Environmental Law.** Examines and analyzes important federal pollution control statutes, including the National Environmental Policy Act, the Clean Air Act and Clean Water Act, Solid Waste Act, and Superfund. Considers related economic theory, ethics, and policy issues.

**LAWS 7212-2. Environmental Litigation.** Examines the litigation strategies and procedures used to enforce and defend against enforcement under environmental protection statutes, such as the Clean Water Act, Clean Air Act, Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, and the Toxic Substances Control Act. Covers civil enforcement, and citizen's suits.

**LAWS 7402-2. Toxic and Hazardous Waste.** Examines the EPA's federal hazardous waste statutes, including the Resource Conservation and Recovery Act of 1976 (RCRA), and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Analyzes the RCRA "cradle-to-grave" hazardous waste program, and addresses the evolving CERCLA liability scheme and cleanup process.

**LAWS 7725-3. American Indian Law I.** Investigates the federal statutory, decisional, and constitutional law that bears upon American Indians, tribal governments, and Indian reservation transactions.

**LAWS 7735 (2-3). American Indian Law II.** Examines selected issues in the field emphasizing major emerging problems and reform proposals. Examples of issues include Alaska development and the Indian Child Welfare Act.

**LAWS 7745 (2-3). Jurisdiction in Indian Country.** Examines the current state of the justice system within Indian nations today. Includes understanding the respective roles of tribal and state law enforcement authorities, as well as the Bureau of Indian Affairs' Office of Justice Services, the Federal Bureau of Investigation, and the Drug Enforcement Administration. Examines relationship between federal and tribal courts; substantive laws; and advocates who appear before them.

**LAWS 8112 (2-3). Seminar: Advanced Natural Resources Law.** Studies historical, literary, and scientific materials and analyzes current problems of natural resource law. Requires additional field trip expenses. Recommended prereqs., LAWS 6002, 6112, 6302, 7725. May be repeated up to 5 total credit hours.

**LAWS 8725-2. Seminar: Advanced American Indian Law.** Examines the current state of the justice system within Indian nations today. It concentrates on the interplay among contemporary federal, tribal, state and local institutions which, taken together, comprise "justice" within Indian Country. Includes understanding the respective roles of tribal and state law enforcement authorities, as well as the Bureau of Indian Affairs' Office of Justice Services, the Federal Bureau of Investigation, and the Drug Enforcement Administration. Coreq., LAWS 7725.

## Family, Gender, and Health

**LAWS 6105-2. Spanish for Family Law Practice.** Provides Spanish-speaking students with vocabulary, legal-drafting skills, and a working knowledge of Spanish to enable them to serve families in the Family Law Division of the Boulder and Adams County Courts. Students prepare letters, memoranda, pleadings, and agreements in Spanish, role-play mock interviews with clients, and study specific legal rules that govern Boulder County and Adams County.

**LAWS 7105-3. Family Law.** Focuses on nature of marriage, actions for annulment and divorce, problems of alimony and property division, separation agreements, and custody of children. Also considers illegitimacy, abortion, contraception, the status of married women in common law and under modern statutes, and relations of parent and child.

**LAWS 7115-2. Juvenile Justice.** Covers a wide array of issues dealing with the legal rights of the unborn, children, and juveniles. Covers the legal status of parent-child abuse, delinquency and crime, and emancipation.

**LAWS 7135-3. Parent, Child, and State.** Examines the legal rights of parents and children in a constitutional framework, as well as the state's authority to define and regulate the parent-child relationship. Addresses rights of parents and children to freedom of expression and religious exercise, termination of parental rights and adoption, paternity orientation, and culture in defining the family.

**LAWS 7405 (2-3). Health Law 2: Medical Malpractice Litigation.** Explores (1) the law controlling ethical issues that arise during the delivery of medical care, (2) the substantive law of medical malpractice and tort reform aimed at reducing the frequency and severity of medical malpractice verdicts, and (3) the practical aspects of litigating a medical malpractice case. Cross-listed at the Health Sciences Center; will include field trips there.

**LAWS 7425 (2-3). Health Law 1: Finance, Administration, and the Organization of Health Care.** Acquaints students with the issues arising at the interface between law and medicine through analysis of cases and other materials. Critically analyzes methods used by courts and legislatures to address medical/legal problems in an effort to determine whether the legal resolution was reasonable and appropriate in light of medical, social, and political considerations. Offered in alternate years.

**LAWS 7505-2. Sexuality and the Law.** Examines the regulation of sexuality in local, state, and federal law, with particular emphasis on sexual orientation. Explores how sexuality shapes, and is shaped by, an array of laws and policies, which may include family law, military regulations, tax law, employment law, trusts and estates, obscenity law, and criminal law.

**LAWS 7513-3. Domestic Violence.** Explores the law, policy, history, and theory of domestic violence. Examines the limits of legal methods and remedies for holding batterers accountable and keeping victims safe; the dynamics of abusive relationships; the history of the criminal justice system's response to domestic violence; the defenses available to battered persons who kill their abusers; the legal paradigm of the sympathetic victim; psychological and feminist theories about abusive relationships; civil rights and tort liability for batterers and third parties; and the intersection of domestic violence with international human rights.

**LAWS 7775-1. Gender Law and Public Policy.** Examines the relationship of law and gender in criminal law, and constitutional law, using feminist theoretical perspectives as the organizing principle. Each perspective is applied to cases and materials on such topics as violence against women, prostitution, pornography, and discrimination in education and athletics.

**LAWS 8415-2. Seminar: Bioethics and Law.** Focuses on legal, moral, and economic analyses of problems posed or soon to be posed by advances in biomedical technologies.

**LAWS 8765-2. Seminar: Gender Law.** Examines the relationship of law and gender in criminal law, and constitutional law, using feminist theoretical perspectives as the organizing principle. Each perspective is applied to cases and materials on such topics as violence against women, prostitution, pornography, and discrimination in education and athletics.

**LAWS 8775-2. Seminar: Advanced Topics in Health Law and Policy.** Addresses advanced legal issues in representing physicians, long-term care institutions, hospitals, and other health providers. Issues range from economic policy, distributive justice, and bioethical questions to antitrust and regulatory issues. Recommended prereq., LAWS 7425. To be taught at Health Sciences Center.

## Government and Public

**LAWS 5425-4. Torts.** Studies nonconsensual allocation of losses for civil wrongs, focusing primarily on concepts of negligence and strict liability.

**LAWS 6005-4. Constitutional Law.** Studies constitutional structure: judicial review, federalism, separation of powers; and constitutional rights of due process and equal protection.

**LAWS 6128 (1-3). Legislation.** Examines theories of legislation and the relation between legislatures and courts, emphasizing problems of statutory interpretation and other issues in the judicial use or misuse of statutes.

**LAWS 6205-3. Lawyers for Social Change.** Helps students expand their perspective to understand the ways in which lawyers more broadly participate in social change work in this service learning class. Analyzes case histories of cause lawyering. The service learning component is based on the precept that one of the most effective ways to learn a role is to perform that role. Students will participate as social change lawyers by working with a local community to help it develop projects that the community believes will help it better itself.

**LAWS 7015-3. First Amendment.** Examines speech and religion clauses of the First Amendment. Includes the philosophical foundation of free expression, analytical problems in First Amendment jurisprudence, and the relationships between free exercise of religion and the separation of church and state.

**LAWS 7025-3. Civil Rights Legislation.** Presents a comprehensive study of federal civil rights statutes briefly reviewed in other courses (e.g., Constitutional Law or Federal Courts). Studies federal civil rights statutes, their judicial application, and their interrelationships as a discretely significant body of law of increasing theoretical interest and practical importance.

**LAWS 7055-3. Education Law.** Considers issues raised by the interaction of law and education. Issues may include the legitimacy of compulsory schooling, alternatives to public schools, socialization and discipline in the schools, and questions of equal educational opportunities.

**LAWS 7205-3. Administrative Law.** Covers practices and procedures of administrative agencies and limitations thereon, including the Federal Administrative Procedure Act, and the relationship between courts and agencies.

**LAWS 7255-3. Local Government.** Studies state legislative and judicial control of the activities, powers, and duties of local governmental units, including home-rule cities and counties, and some problems of federal, state, and local constitutional and statutory limitations on governmental powers when exercised by local governmental units (e.g., the powers to regulate private activities, tax, spend, borrow money, and condemn private property for public uses). Offered in alternate years.

**LAWS 7325-3. Election Law.** Examines the rapidly evolving field of election law: the right to vote, voting procedures, redistricting, candidate selection, campaign finance laws, and direct democracy. Emphasizes federal law, including applicable constitutional jurisprudence.

**LAWS 7475-2. Advanced Torts.** Studies selected tort actions and theories. Topics covered may include “dignitary torts” (e.g., defamation, privacy, etc.), business torts, and product liability. Offered in alternate years.

**LAWS 7515-3. Poverty Law.** Explores the legal and policy responses to poverty in the United States and addresses how the law shapes the lives of poor people and communities. Examines the extent of poverty in the United States, the root causes, and the historical development of social welfare policy. Focuses on the rights-based aspect of poverty law and various policies that attempt to ameliorate poverty.

**LAWS 7525-3. Race and American Law.** Examines the judiciary’s approach to racial discrimination from America’s colonial period to the present day. Concludes with an analysis of the contemporary status of racial subordination in the legal system and considers recent scholarly critiques of the law’s limitations in effecting racial justice. Employs an interdisciplinary approach and covers the experiences of American Indians, African Americans, Asian Pacific Americans, and Chicana/os.

**LAWS 8005-2. Seminar: Advanced Constitutional Law Equality and Privacy.** Addresses “Equal Protection” rights under the Fourteenth Amendment and “privacy” rights to personal autonomy. Analyzes varied constitutional grounds for recognizing or rejecting abortion rights; limits on Congressional power to pass civil rights laws granting broader rights than the Fourteenth Amendment does; treatment of sexual orientation-related laws and government actions as “privacy” versus “equality” matters; and

“benign”/“remedial” race- and sex-based government decisions such as affirmative action and same-sex schools.

**LAWS 8015-3. Seminar: Constitutional Theory.** Examines the role of the courts and the other branches of government in defining and enforcing constitutional values. Relevant readings are from philosophy, social sciences, and legal scholarship, as well as cases.

**LAWS 8025-2. Seminar: Advanced Topics in Federalism.** Explores the development of “Our Federalism”, the relationship between federal and state governments, from the founding period of the US Supreme Court’s recent New Federalism jurisprudence. Studies historical material, commentary, and case law, and addresses how federalism is defined; the values that federalism serves; the role of federalism in our interconnected, global society; the Supreme Court’s boundaries of federalism; the direction of New Federalism.

**LAWS 8035-2. Seminar: Antidiscrimination and the First Amendment.** Addresses past and continuing debates involving potential tensions between antidiscrimination principles and free speech, free exercise, and establishment clause values. Examines constitutional protections under the First Amendment and the equal protection clause, together with an array of existing and proposed federal and state antidiscrimination laws regulating employment, housing, and public accommodations, among other areas.

**LAWS 8045-2. Seminar: Comparative Constitutional Law.** Examines legal structures and concepts typically found in constitutions, including judicial review, distinction between legislative and executive authority, federalism and the principle of subsidiarity, the relationship between church and state, free speech and press, and social welfare rights. Examines differences between constitutional law and other domestic law, role of comparative constitutional law in domestic constitutional law adjudication. Emphasizes American and Swedish perspectives.

**LAWS 8055 (1-2). Seminar: Media, Popular Culture, and the Law.** Examines how the institutions, practices, and the very identity of law are in part affected by the media through which law is apprehended and communicated. Hence the general question posed in this seminar: To what extent and how are the forms and methods of the new media having an effect on the perception, role, and identity of law? This is a year-long seminar.

**LAWS 8095-2. Seminar: Advanced in Constitutional Law, Theory and Practice of Free Speech in the U.S.** Explores how theories of social freedom and self-governance developed in the United States. Analyzes the most controversial socio-legal issues as they relate to privacy, equal protection and other questions of substantive due process. Discusses recent trends in national security and information privacy to evaluate their overall relevance to civil liberties and nascent influence on the fundamental rights debate in the U.S. and abroad.

**LAWS 8395-2. Seminar: Separation of Powers.** Explores the constitutional relationships among the three branches of the federal government in the sphere of domestic matters, omitting foreign affairs and war. Develops topics including executive orders, Congressional control of the executive and the courts, appointment and removal of officers, impeachment, executive privilege, use of military tribunals, and the election of 2000. A seminar paper will be required.

**LAWS 8405-2. Seminar: Public Health Law and Ethics.** Explores rules of law pertaining to the American public health care system and the ethical issues raised by the government’s effort to protect the health of the American people. To be held at Health Sciences Campus.

**LAWS 8508-2. Seminar: Constitutional Foundations Core Ideas.** Focuses on core ideas in U.S. constitutional law, such as means/ends analysis, institutional competence, rights definitions, and juridical techniques for limiting governmental powers. Draws from historical writings, contemporary press accounts, learned treatises, oral arguments, law review articles, and key judicial opinions such as *McCullough v. Maryland*, *Lochner v. New York*, *Brown v. Board of Education*.

**LAWS 8515-2. Seminar: Forced Labor.** Reviews several regimes of compulsory labor that have been central to the American experience: Black chattel slavery in the antebellum South; debt peonage, criminal surety, and related institutions of agricultural involuntary servitude; convict leasing and other forms of compulsory inmate labor; “white slavery” and prostitution; and forced labor among immigrants. Emphasizes the complicated role that the law



has played, and in some respects continues to play, in both supporting and undermining such institutions.

**LAWS 8535-2. Seminar: Class and Law.** Explores issues relating social class to such areas as labor relations, law enforcement, controls on radical movements, and the distribution of wealth and power. Considers problems defining social class.

**LAWS 8705-2. Seminar: Affordable Housing.** Explores the policy, legal, and practical dynamics that drive the development and preservation of privately owned, government subsidized affordable housing. Investigates the nature of the market for housing, with particular emphasis on multifamily rental housing, and debates about market failure in that context and then outline and contrast the major regulatory responses to such market failure. Explores how subsidy programs work in practice, focusing on model documents to frame sample transactions.

**LAWS 8755-2. Seminar: Higher Education and the Law.** Examines the goals, governance, norms, and ideals of American institutions of higher education, and how those policies are shaped by the legal system. Examines the legal relationship between institutions of higher education and its various constituents: faculty, presidents, governing boards, students, alumni, and staff. Spans several traditional doctrinal categories, including contract, torts, employment law, constitutional law, intellectual property, tax, and antitrust.

## Intellectual Property, Technology, and Telecommunications

**LAWS 6301-3. Introduction to Intellectual Property.** Provides an overview of our nation's intellectual property laws, including patents, copyrights, trademarks, and trade secrets. Discusses other matters related to intellectual property, including licensing, competition policy issues, and remedies.

**LAWS 6321-3. Computer Crime.** Explores the legal issues that judges, legislators, prosecutors, and defense attorneys are confronting as they respond to the recent explosion in computer-related crime. Includes the Fourth Amendment in cyberspace, the law of electronic surveillance, computer hacking and other computer crimes, encryption, online economic espionage, cyberterrorism, First Amendment in cyberspace, federal/state relations in the enforcement of computer crime laws, and civil liberties online. Same as TLEN 5535.

**LAWS 7241-3. Telecommunications Law and Policy.** Examines laws governing telecommunications industries, including federal and state regulation and international aspects. Includes telephone, cable, satellite, cellular, and other wireless systems, and the Internet.

**LAWS 7301 (2-3). Copyright.** Examines state and federal laws relating to the protection of works of authorship ranging from traditional works to computer programs. Studies the 1976 Copyright Act as well as relevant earlier acts. Gives attention to state laws, such as interference with contractual relations, the right of publicity, moral right, protection of ideas, and misappropriation of trade values, that supplement federal copyright.

**LAWS 7311 (2-3). Patent Law.** Covers selected topics, such as patentable subject matter, patentability, and utilization of patent rights through licensing and infringement litigation. Covers practice and procedure of the patent and trademark office.

**LAWS 7321-2. IP and Technology Contracting.** Covers transactions, and often high-tech deals involving intellectual property rights. Studies IP ownership; assignment or rights; commercialization transactions (licensing, distribution, strategic); antitrust; and emerging issues. Gives students essential tools to draft and analyze technology contracts. Prereqs., LAWS 6301 or 7301.

**LAWS 7323-2. Patent Litigation.** Focuses on unique aspects of patent litigation: substantive patent law, civil procedure, federal jurisdiction, and litigation strategy; includes claim construction, infringement, anticipation and obviousness defenses, unenforceability challenges, declaratory judgments, injunctions, damages, settlements, licenses, and trial strategy. Of interest and useful to those interested in intellectual property generally, not just patents or in litigation.

**LAWS 7341-3. Trademark and Unfair Competition Law.** Examines trademark protection, the interaction of trademark and unfair competition law with other intellectual property doctrines, the requirements for acquiring and retaining federal trademark rights, false advertising and other misrepresentations, the

right of publicity and related claims, remedies for infringement, and international aspects of trademark protection.

**LAWS 7361-2. Privacy and Security in the Digital Age.** Introduces students to the laws that regulate the basic technologies of the Internet and the management of information in the digital age. It examines the most significant statutes, regulations, and common law principles that comprise this emerging legal framework, including the Federal Wiretap Act, the HIPAA Privacy Rule, and the Digital Millennium Copyright Act.

**LAWS 7371-3. Standardization and Standards Wars.** Examines current issues in the standardization of telecommunications and information technologies. Covers the importance of standards, government and private sector perspectives, and the impact of information age technologies on standards of development. Emphasizes key national and international organizations.

**LAWS 8311-2. Seminar: Computer Crimes.** Explores legal issues that judges, legislators, prosecutors, and defense attorneys confront with the recent explosion in computer related crime. Includes Fourth Amendment in cyberspace, law of electronic surveillance, computer hacking and other computer crimes, encryption, online economic espionage, cyberterrorism, First Amendment in cyberspace, federal and state relations in enforcement of computer crime laws, and civil liberties online.

**LAWS 8321-2. Seminar: Computers and the Law.** Explores a range of topics surrounding the juxtaposition of computers and law. Most are aware of the impact that law has on computers through the myriad of regulations that govern computers and related technologies. Less well known is the impact that computer technology is having on governance and on the practice of law. Explores both sides of this dynamic interplay between law impacting computing, and computing impacting law.

**LAWS 8361-2. Seminar: Information Privacy.** Explores the laws that regulate the basic technologies of the Internet and the management of information in the digital age. It examines the most significant statutes, regulations, and common law principles that comprise this emerging legal framework, including the Federal Wiretap Act, the HIPAA Privacy Rule, and the Digital Millennium Copyright Act.

## International

**LAWS 6008-3. The International Legal Order: History and Foundations (1500–1950).** Examines the structural and historical aspects of the international legal system. Examines contemporary attitudes, doctrines, and theories of international law by exploring the fundamental questions since the discipline's inception in the 16th century. Provides a working familiarity with the origins of Public International Law, International Human Rights Law, International Criminal Law, International Organizations, International Trade Law, Law and Development, and Conflict of Laws.

**LAWS 6210-3. Comparative Law.** Considers foreign solutions to certain key legal problems. Focuses on general problems of legal process, rather than on substantive rules. Topics include the role of lawyers, civil dispute resolution, criminal procedure, and employment discrimination. Covers different legal systems in different years.

**LAWS 6220-3. Introduction to Jewish/Israeli Law.** Outlines the history and basic principles of Jewish Law, Halakhic system that encompasses Biblical law and the Rabbinic law. Covers Legal Sources of the Jewish laws, interpretation, legislation, custom, precedence and legal reasoning. Explores the study of modern legal system of the state of Israel and examines the problematic nature of the incorporation of the Law of personal status in the Rabbinical and in general courts.

**LAWS 6400-3. International Law.** Examines the nature and sources of international law, relationship between international law and domestic U.S. law, role of international organizations such as the United Nations, methods of resolving international disputes, bases of international jurisdiction, and select substantive areas of international law, including laws governing the use of force and the protection of human rights.

**LAWS 6420-1. Law and the Holocaust.** Explores comparative law, jurisprudence, conflicts of laws and international law. Examines the Nazi philosophy of law emanating from its egregious racial ideology, and how it was used to pervert Germany's legal system to discriminate against, ostracize, dehuman-

ize, and eliminate certain classes of people. Studies the role of international law in rectifying the damage by bringing perpetrators to justice and constructing a legal system designed to prevent a repetition.

**LAWS 6510 (2-3). International Environmental Law.** Examines international environmental law, including transboundary impacts and global issues. Addresses such issues as intergenerational equities, principles of compensation, and if international environmental norms should receive special environmental norm consideration. A course in public international law is not a prerequisite, but students who have not taken such a course will probably find it useful to do some additional background reading. Offered in alternate years.

**LAWS 6518-3. Introduction to Islamic Law.** Examines the Formative Era of Islamic law, through its sources and methodologies. Examines the Established Era of the Schools of Law including differences between Sunni and Shiite Islamic Law. Examines human rights, terrorism, political Islam, women's rights and rights of religious minorities, criminal law, and finance law, and the growing role of fundamentalism in these areas. Examines the relevance of Islam and Islamic law in today's world.

**LAWS 6531-3. Comparative Employment Law.** In today's globalized world, lawyers are increasingly likely to encounter issues involving foreign employment. The course will provide substantive knowledge about foreign employment law and its relation to American law, as well as a comparative framework to assess the relative merits of the American approach to employment law.

**LAWS 7065-3. Immigration and Citizenship Law.** Covers legal issues pertaining to noncitizens of the United States, especially their right to enter and remain as immigrants and nonimmigrants. Topics include admission and exclusion, deportation, and refugees and political asylum. Approaches topics from various perspectives, including constitutional law, statutory interpretation, planning, ethics, history, and policy.

**LAWS 7100 (2-3). International Criminal Law: Theory and Practice.** Exposes students to the rapidly growing body of jurisprudence, both international and national, wherein international humanitarian and human rights law are being applied for the purposes of prosecution, trial and punishment of individuals alleged to be responsible for the commission of war crimes, crimes against humanity, genocide and, more recently, terrorism. Prereq., LAWS 6400.

**LAWS 7310-3. International Dispute Settlement.** Examines various mechanisms for the settlement of international disputes. Includes negotiation, inquiry, mediation, conciliation, arbitration, and adjudication. Focuses on intergovernmental dispute resolution. Prereq., any international law course or alternative dispute settlement.

**LAWS 7320-3. International Criminal Law.** Surveys international human rights law and international crime and punishment. Addresses idea of rights from a historical, philosophical, conceptual and analytical perspective; explores the "primary rules of conduct" as well as adjudication and remedies, and selected rights from a comparative perspective. Recommended prereq., LAWS 6400.

**LAWS 7440-3. International Human Rights Law.** Surveys international human rights both in law and in philosophy, both current and historical. Prereq., LAWS 6400.

**LAWS 7605-2. Refugee and Asylum Law.** Focuses on protections offered under international and domestic law for persons who are threatened by persecution or other adverse conditions in their country of origin. Covers who is a refugee and the protections they have or do not have under United States and international law.

**LAWS 7611 (2-3). International Business Transactions.** Examines the sources of international business law, the relationship between such law and the U.S. legal system, the choice of law in international business disputes, the special issues that arise when doing business with foreign governments, the law governing international sales and the shipment of goods, and international intellectual property protection. Offered in alternate years.

**LAWS 8310-2. Seminar: International Crime and Punishment.** Addresses issues in international criminal law in three parts: 1) basic contents of international law, 2) international criminal tribunals that enforce international criminal law, and 3) national efforts to bring international criminal prosecutions. Recommended prereqs., LAWS 6400 and 7440.

**LAWS 8320-2. Seminar: Oil and International Relations.** Addresses the extent to which the international community of nations is oil dependent. Assesses the impact and the geopolitical dangers to international relations arising from the expanding demand for scarce oil from developing, as well as developed, economies.

**LAWS 8430-2. Seminar: Comparative Public Health Law and Ethics.** Compares public health law systems to those in other countries. Studies the goals, legal structures, and services provided, together with such issues of coercion as quarantines, monitoring, mandates and prohibitions, and forcing pharmaceutical companies to make available inexpensive generic drugs.

## Jurisprudence and Perspective

**LAWS 6103 (2-3). Legal Ethics and Professionalism.** Examines the legal profession as an institution, its history and traditions, and the ethics of the bar with particular emphasis on the professional responsibilities of the lawyer. Discusses the Model Rules of Professional Conduct.

**LAWS 6108-3. Conflict of Laws.** Examines the rules and principles governing the resolution of multi-jurisdictional conflicts of laws in the United States and abroad. Considers various theoretical bases for choice of law principles, as well as the principal constitutional limitations on choice of law. Considers the extent to which different choice-of-law theories or approaches serve four traditional choice-of-law goals—uniformity; avoidance of forum shopping; predictability; and ease of administration.

**LAWS 6308-2. Law and Biology of Human Nature.** Investigates whether humans have an instinct for fairness and justice, the nature of good and evil, and why people behave the way they do. Studies why groups of people pass laws to express how they expect group members to behave. Examines questions about the foundations of law, first by surveying traditional philosophical and economic approaches to human behavior, and then by examining recent developments in genetics, human evolution and the emerging law, economics and biology synthesis.

**LAWS 6318-3. Economic Analysis of Law.** Introduces the basic elements of economic theory and emphasizes demand and utility, cost, and optimality.

**LAWS 6503-3. Law and Social Sciences.** Explores disparities in criminal sentencing and death penalty cases; quality and effectiveness of legal representation for indigent criminal defendants; relationship between modifications in traditional steps in legal process; connection between alternative tort doctrines and volume of litigation, trial rates, plaintiff success rates and award size; impact of congressional statutes and US Supreme Court decisions on handling and outcomes of habeas corpus petitions.

**LAWS 6528-3. Capital Punishment in America.** Surveys the history and current status of capital punishment in the United States, with a critical examination of arguments both for and against the death penalty.

**LAWS 7085-2. Law and Religion.** Uses judicial decisions as well as historical and theoretical materials to explore significant aspects of the relationship between law and religion. The religion clauses of the First Amendment are a central but not exclusive subject of study. Offered in alternate years.

**LAWS 7128 (2-4). Jurisprudence.** Addresses a number of fundamental questions, such as: What is law? What should it be? How is it created? Our readings consist of cutting-edge articles from leading modernist/postmodernist schools of thought including legal formalism, legal realism, interpretive theory, law and economics, feminist jurisprudence, critical legal studies, and law and literature.

**LAWS 8318-2. Seminar: Law and Economics.** Introduces the uses and limitations of microeconomic theory for understanding and resolving legal problems. Emphasizes concepts prominent in the law and economics literature such as cost, transaction costs, utility, and rational self interest.

**LAWS 8538-2. Seminar: Modern Legal Theory Core Ideas.** Explores key ideas that have shaped American law and legal thought, such as Holmes' bad man, the Coase Theorem, the "hunch" theory of law, and others. Focuses on researching and writing many short papers.

**LAWS 8548-2. Seminar: Theory of Punishment.** Explores the various justifications that philosophers have developed to explain why we have the right to punish. Examines the historical evolution of our punishment system and

focuses on the death penalty as a critical contemporary issue in the debate about the proper role of punishment in our society.

**LAWS 8608-2. Seminar: Power, Ethics, and Professionalism.** Examines critically the possibility and character of ethical reasoning within the legal profession in light of its institutional structures. Explores descriptive/normative accounts of the profession's structure, "professionalism," and individual conscience. Put simply, the seminar explores whether it is possible to be a good lawyer and ethical person.

## Litigation and Procedure

**LAWS 5223-2. Appellate Court Advocacy.** Students prepare appellate briefs and related documents and deliver oral arguments before a three-judge court composed of faculty, upper-division students, and practicing attorneys. Practice arguments are videotaped and critiqued.

**LAWS 5303 (2-3). Civil Procedure 1.** Studies modern practice in civil suits, including rules governing pleading, joinder of parties, discovery, jurisdiction of courts over the subject matter and parties, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal Rules of Civil Procedure and their Colorado counterpart.

**LAWS 5313-3. Civil Procedure 2.** Studies modern practice in civil suits, including rules governing pleading, joinder of parties, discovery, jurisdiction of courts over the subject matter and parties, right to jury trial, appeals, and res judicata and collateral estoppel, with emphasis on the Federal Rules of Civil Procedure and their Colorado counterpart.

**LAWS 5503-4. Criminal Law.** Studies statutory and common law of crimes and defenses, the procedures by which the law makes judgments as to criminality of conduct, the purposes of criminal law, and the constitutional limits upon it.

**LAWS 6035-3. White Collar Crime.** Examines distinctions between white collar crime and other types of criminal activity and the needs for and arguments against white collar laws and law enforcement. Studies securities fraud, mail and wire fraud, insider trading, money laundering, false statements, conspiracy and criminal forfeiture statutes. Includes use of the grand jury, privileges applicable in the corporate setting, immunity, discovery and the impact of parallel civil proceedings. Examines effect of government policy on corporations and their counsel, pre-trial and trial strategy, jury selection, and victim notification and restitution options.

**LAWS 6045-3. Criminal Procedure: Investigative Phase.** Focuses primarily on the constitutional limitations applicable to such police investigative techniques as arrest, search, seizure, electronic surveillance, interrogation, and lineup identification.

**LAWS 6213-2. Advanced Appellate Advocacy.** Advanced study and practice of written and oral appellate advocacy. Builds on the foundation established in the required first-year course in appellate advocacy, but provides more extensive coverage, practice, and evaluation. Personalized instruction in brief writing, including detailed, one-on-one critique of their work. Include advanced techniques for organizing and writing a brief, and advanced instruction on the strategy and process of oral argument. Required to research, write, and rewrite an appellate brief, and conduct several oral arguments. Attend oral arguments of the United States Court of Appeals for the Tenth Circuit and the Colorado Court of Appeals. Prereq., LAWS 7106.

**LAWS 6353-3. Evidence.** Studies the methods and forms of proof in litigation, including detailed consideration of hearsay, impeachment of witnesses, relevancy and certain restrictions on authentication and best evidence doctrines, and privileges.

**LAWS 6803-3. Quantitative Methods.** Equips students to deal effectively with experts, whether as consultants or as adverse witnesses, and to enable the identification of a quantitative issue. Helps students to become multi-dimensional in quantitative literacy. Enables students to be comfortable reading statistical arguments, performing basic analyses, writing about statistics, expressing quantitative ideas in graphs, questioning an expert, and understanding the power of computer programming.

**LAWS 7003-3. Federal Courts.** Looks at structure and jurisdiction of the federal courts, emphasizing problems of federalism and separation of powers and their relationship to resolution of substantive disputes.

**LAWS 7013-2. Supreme Court Decision Making.** Students deliberate over several important cases as "justices" of the Supreme Court. Class is divided into three "courts" with the first hour spent in deliberation and the second hour in discussion of the deliberative process as well as the substantive issues.

**LAWS 7023-3. Jury Selection and History.** Studies the history of the jury from ancient times through the implications of Apprendi, the grand jury from the time of Henry II through modern federal practice, and current jury selection procedures, both federal and Colorado, both civil and criminal. Experienced trial attorneys will work with students to demonstrate jury selection.

**LAWS 7045-3. Criminal Procedure: Adjudicative Process.** Focuses primarily on criminal procedure at and after trial. Looks at bail, prosecutorial discretion, discovery, plea bargaining, speedy trial, jury trial, the right to counsel at trial, double jeopardy, appeal, and federal habeas corpus.

**LAWS 7303-3. Complex Civil Litigation.** Covers civil procedure in modern complex multiparty suits, including class actions in such settings as employment discrimination and mass torts, and problems in discovery, joinder, res judicata, collateral estoppel, and judicial management in such suits. Offered in alternate years.

**LAWS 7333-2. Advanced Evidence: Forensic Science and the Criminal Courts.** Explores the admissibility of forensic science opinion and expert testimony, its use as evidence at a trial, and the challenges that such evidence may pose for the courts and the entire criminal justice system in the future.

**LAWS 7345-2. Comparative Criminal Procedure.** Takes an in-depth look at some of the basic features of modern criminal justice systems that share the civil law tradition with the hope that such study will provide a vehicle for a deeper understanding of the strengths and weaknesses of the American system of criminal justice. Prereq., LAWS 6045.

**LAWS 8335-2. Seminar: Advanced Criminal Procedure.** Focuses on a particular topic in criminal procedure. Topics include the privilege against self-incrimination, juries, and defense and prosecution ethics.

## Practice: Clinical and Simulation

**LAWS 6009-4. Civil Practice Clinic 1.** Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6019-4. Civil Practice Clinic 2.** Emphasizes procedural and practical remedies and defenses available in civil litigation. Assigns civil cases related to the course material. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6029-4. Criminal Defense Clinic 1.** Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6039-4. Criminal Defense Clinic 2.** Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants in Boulder courts. Develops working knowledge of courtroom skills. Prereq. or coreq., LAWS 6353.

**LAWS 6079-4. Criminal Defense Clinic.** Provides thorough grounding in problems of criminal defense. Students defend indigent misdemeanants. Develops working knowledge of courtroom skills, advocacy, and evidence presentation. Concludes with full mock trial. Prereq. or coreq., LAWS 6353.

**LAWS 6109-2. Trial Advocacy.** Focuses on voir dire, opening statement, direct examination of witnesses, and cross examination.

**LAWS 7029-3. Appellate Advocacy Clinic.** Provides a clinical course that enables students to work on briefs of criminal cases being handled by the Appellate Division of the Public Defender or Attorney General's Office. Instruction in oral advocacy is given. Enrollment limited to eight students.

**LAWS 7106 (1-2). Rotherger Moot Court Competition.** Offers an intensive involvement in legal research, appellate brief writing, and oral arguments in a competitive context. Student finalists may continue involvement in regional and national competitions.

**LAWS 7159-2. Advanced Trial Advocacy.** Offers an advanced course covering trial practice elements. Open only to students who have taken LAWS 6109.

**LAWS 7169-2. Motions Advocacy.** Provides practical training in preparing and arguing pretrial, post-trial, and chambers motions to an experienced federal judge based on materials from actual case files. Assigns some research papers. Limited to 15 third-year students with interest in trial advocacy and willingness to participate in confrontational exercises. Counts as practice hours.

**LAWS 7209-3. Natural Resources Litigation Clinic.** Offers hands-on experience in the practice of natural resources law in the Rocky Mountain region to a select number of clinic students. The clinic's docket of active cases focuses on public land law and the environmental statutes protecting those lands and their resources. Students participate in projects that test the full range of lawyering skills, including traditional litigation, administrative advocacy, legislative drafting, and the conduct of complex negotiations and settlements.

**LAWS 7309 (2-4). American Indian Law Clinic.** Offers a clinical education course involving participation in the representation and advocacy of Indian causes—land or water claims, Indian religious freedom, job or other discrimination based on race, and issues implicating tribal sovereignty. Recommended prereq., LAWS 7725.

**LAWS 7406-1. International Moot Court Competition.** Open only to students who actively participate in the seminar preparing for the competition, in the preparation of memorials for the competition, and in the practice of oral arguments or regional oral arguments.

**LAWS 7409-3. Legal Negotiation.** Explores the fundamentals of effective negotiation techniques and policies for lawyers. Students engage in mock negotiations of several legal disputes. Credit is not given for both LAWS 7419 Legal Negotiation and Dispute Resolution and this course.

**LAWS 7429-2. Alternative Dispute Resolution.** Examines a variety of dispute resolution processes, such as mediation, arbitration, minitrials, and court-annexed settlement procedures, as alternatives to traditional court adjudication. Credit not given for both LAWS 7419 Legal Negotiation and Dispute Resolution and this course.

**LAWS 7439-2. Mediation.** Explores mediation, one of the more important methods of alternative dispute resolution, and the legal issues that may arise related to mediation. Considers what kinds of persons and disputes are most appropriate for mediation. Includes role playing.

**LAWS 7449-4. Juvenile Law Clinic.** Examines the world of child welfare from the view of the child client, by representing their best interests in abuse and neglect cases. As Guardians ad litem, students will represent children in abuse and neglect cases from the beginning, at the temporary shelter hearing, through the conclusion of the case at a permanency orders hearing. Prereq., LAWS 6353. May be repeated up to 8 total credit hours.

**LAWS 7509-1. Trial Competition.** Student teams further develop trial and advocacy skills in a competitive mock-trial format involving two or more rounds of trials. Requires preparation of trial briefs and drafting other court pleadings and documents. Credit is limited to the top two teams (six students). Student finalists may continue involvement in regional and national competitions. May be repeated within the term up to 4 total credit hours.

**LAWS 7609-1. Law Practice Management.** Studies the establishment of a solo or small-firm legal practice. Topics include the business structure (PC, LLC, etc.), office systems, marketing and development, staffing, liability insurance, managing time, technology, and billing. (This practice course counts toward the 14 credit hour maximum of practice hours.) Course supported by the Section of Law Practice Management of the ABA in memory of Harold A. Feder, CU Law '59.

**LAWS 7619-2. Entrepreneurial Law Clinic.** Advise indigent clients who need legal services in the founding of their business or not-for-profit firms, registering LLCs, and drafting employment and intellectual property agreements. Prereq., two of the following courses: Agency Partnership and the LLC, Corporations, Securities, Seminar on Corporate Law, Law and Finance for Entrepreneurs, Accounting Issues for Lawyers, Patent Law, Trademark, and International Business Transactions.

**LAWS 7751-3. Arbitration.** Discusses the nature of arbitration, tactical considerations in whether to use this form or another form of dispute resolution, the drafting of effective contracts to arbitrate the enforceability of these contracts, and the enforcement of arbitration awards. Covers the preclusive effect of arbitration proceedings, multiparty arbitration, and choice of law. Students conduct simulated arbitrations.

**LAWS 7809 (2-4). Technology Law and Policy Clinic.** Features technology law advocacy before administrative and legislative bodies. The mission of TLPC is: 1) to train and produce students equipped to conduct thoughtful analysis, and 2) provide unbiased assistance in the public interest concerning technology issues to regulatory entities, courts, legislatures and standard setting bodies. Recommended prereqs., LAWS 6301, 6318 or 7241.

**LAWS 7939 (1-7). Extern Program.** Extern credit may be earned for uncompensated work for a sponsor, which may be any lawyer, judge, or organization that employs lawyers or judges and is approved by the Academic and Student Affairs Committee. Work is done under the direction of a field instructor (a lawyer or judge as the sponsor) and a member of the law faculty. Requires a substantial writing component and 50 hours of working time per credit hour. A minimum of 1 and a maximum of 7 credit hours may be earned. Classified as practice credit.

## Property

**LAWS 5624 (2-3). Property 1.** Topics include personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls.

**LAWS 5634 (2-3). Property 2.** Topics include personal property, estates and interests in land, landlord-tenant, basic land conveyancing, and private land use controls.

**LAWS 6004-3. Real Estate Transactions.** Focuses on legal issues that arise in all phases of real estate transactions, with an emphasis on the role of the lawyer in the business of real estate as well as on the regulation of real estate markets.

**LAWS 6104-3. Wills and Trusts.** Covers intestate succession; family protection; execution of wills; revocation and revival; will contracts and will substitutes; creation of trusts; modification and termination; charitable trusts; fiduciary administration, including probate and contest of wills; and construction problems in estate distribution.

**LAWS 6114-2. Construction Law.** Focuses on the basic principles and practices of construction law. Provides an overview of construction industry participants and players (engineers, contractors, insurers, etc.) and discusses and analyzes the various obligations and liabilities of these parties. Covers construction and design contracting, construction claims, professional negligence, construction insurance and suretyship, and ADR in construction. Provides transactional-practice oriented exercises.

**LAWS 7024 (2-3). Real Estate Planning.** Considers various contemporary legal problems involved in the ownership, use, development, and operation of real estate. Emphasizes the income tax and financing aspects of commercial and residential use and development such as shopping plazas and apartment buildings. Same as ACCT 6730.

**LAWS 7154-3. Land Use Planning.** Explores mechanisms for public control of private land uses, such as planning, zoning, and regulation of land development; including consideration of federal and state constitutional and statutory limitations on local governments. Offered in alternate years.

**LAWS 7164-2. Land Conservation Law.** Focuses on private land conservation efforts in the United States, and particularly Colorado, and also considers public land conservation programs. Analyzes real property principles and instruments used to protect land, and the development and acceptance of conservation easements in gross as a mechanism for protection, financing mechanisms for land conservation, including direct government funding and indirect funding through tax incentives at the federal, state and local levels. Understanding of Real Property and Tax concepts helpful.

**LAWS 8104-2. Seminar: Cities, Suburbs, and the Law.** Explores dynamics that play out in the relationship between cities, suburbs, exurbs and other patterns of urban development. Explores the nature of local power, relations between local jurisdictions, and metropolitan and regional approaches to governance.

Includes fiscal disparities, ethnic and racial segregation, sprawl and growth controls, affordable housing, transportation, and the urban/rural divide.

## Research and Writing

**LAWS 5226-2. Legal Writing.** Provides an intensive introduction to the resources available for legal research. Students also prepare written material of various kinds designed to develop research skills, legal writing style, and analysis of legal problems.

**LAWS 6206-3. Litigation Drafting.** Examines the intersection of civil procedure and legal writing. Emphasizes the drafting of persuasive adversarial litigation documents, including complaints, answers, motions in limine, motions to dismiss, motions of summary judgment, and jury instructions. Intensive writing and workshop format.

**LAWS 6226 (2-3). Advanced Legal Research.** Focuses on improvement of legal writing skills including organizing, drafting, and revising legal writing. Improves research and analysis skills.

**LAWS 6236-2. Judicial Opinion Writing.** Places contemporary American judicial opinion in historical and comparative context. Analyzes individual and institutional writing choices that authors of judicial opinions must make and ethical dilemmas they must confront. Builds upon the first-year legal-writing curriculum. Challenges students to develop and defend their own opinion-writing approaches and styles as well as to write from approaches and in styles that are not their own.

**LAWS 6458-2. Creative Writing for Lawyers.** Requires substantial writing and reading. Begins with participants bringing to class a piece of creative writing consisting of three to five thousand words. Each session consists of one hour of discussion and critique of an assigned writing exercise that everyone has prepared for the class, and one hour of workshop critique of each participant's longer work, in turn.

**LAWS 6856-2. Advanced Legal Research.** Offers an in-depth look at research resources and methods. Includes sources from the judicial, legislative, and executive branches of federal and state government; research in topical areas such as environmental law, taxation, and international law; and extensive coverage of secondary and nonlaw resources. Covers both print and electronic sources. Students will have several assignments and a final project.

**LAWS 7846-1. Independent Legal Research.** Involves independent study and preparation of a research paper under faculty supervision. Students produce a research paper equivalent to a seminar research paper. A draft is submitted, subjected to critique by the faculty member, and redrafted. Available during or after the fifth semester of law school. Prereq., instructor consent.

**LAWS 7896-1. Independent Legal Research: Law Review.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *University of Colorado Law Review*.

**LAWS 7906-2. Independent Legal Research: Law Review.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *University of Colorado Law Review*.

**LAWS 7916-1. Independent Legal Research: Journal of International Environmental Law and Policy.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Colorado Journal of International Environmental Law and Policy*.

**LAWS 7926-2. Independent Legal Research: Journal of International Environmental Law and Policy.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Colorado Journal of International Environmental Law and Policy*.

**LAWS 7936-1. Independent Legal Research: Journal of Telecommunications and High Technology Law.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Journal of Telecommunications and High Technology Law*.

**LAWS 7946-2. Independent Legal Research: Journal of Telecommunications and High Technology Law.** Gives students the opportunity to participate in the research, writing, and editing activities involved in publishing the *Journal of Telecommunications and High Technology Law*.

**LAWS 8458-2. Seminar: Law and Literature.** Focuses on the question of what literature can teach lawyers through a variety of literary works and films. Covers traditional works by Shakespeare, Tolstoy, Camus, Kafka, and Melville, as well as more contemporary works by Toni Morrison and Norman Mailer. Several short reflection papers, a journal, and a final paper will be required.

## Taxation

**LAWS 6007-4. Income Taxation.** Emphasizes the fundamentals of the federal income tax system and examines its impact on the individual.

**LAWS 6138 (2-3). Federal Tax Politics.** Studies the tax system as the nexus of politics and economics. Examines how various interests and entities use the many tools of political power to shape the tax system. Intended for those interested in politics and legislation, rather than for the tax specialist.

**LAWS 6157-3. Corporate Taxation.** Studies federal income taxation related to taxable corporations, the entities through which a large part of the economic activity in the U.S. is conducted. Includes creation, operation, distributions, sale of interests, and liquidation.

**LAWS 6167-3. Taxation of Conduit Entities.** Studies federal income taxation of pass-through entities such as are used by most small businesses in the U.S. Includes creation, operation, distributions, sale of interests, and liquidation.

**LAWS 7207-3. Federal Estate and Gift Tax.** Analyzes federal estate and gift taxation of inter vivos and testamentary transfers, introduces income taxation of estates and trusts, and involves elementary estate planning.

**LAWS 7217-2. Estate Planning.** Discusses problems and solutions for owners of various-sized estates and different types of assets including jointly-held property, stock in closely-held corporations and farms, analysis of federal taxation of generation-skipping transfers in trust, postmortem estate planning, and drafting of trusts and wills. Prereqs., LAWS 6104 and LAWS 7207.

**LAWS 7617-3. International Taxation.** Covers basic aspects of the United States taxation of income earned abroad by its citizens and the taxation of income derived by foreign persons from U.S. sources, including the implications of income tax treaties. Prereq., LAWS 6007 or 6157. Same as ACCT 6780.

**LAWS 8407-2. Seminar: Tax Policy.** Considers questions of fairness, efficiency, and promotion of social goals as they arise in federal, state, and local systems of raising revenue through user fees and through taxation of income, sales, property, and estates and gifts. Past seminar papers have covered the taxation of business organizations, the value added tax, the social security tax, the taxation of farming, and the tax exemption of religion. Offered in alternate years.

# College of Music

## Elective Music

**MUEL 1081-3. Basic Music Theory.** Introduction to music notation, meter and rhythm, scales, intervals, triads, seventh chords, fundamentals of harmonic progression, voice leading, aural skills, and composition. For nonmusic majors who have little or no previous background in the subject. Formerly EMUS 1081. Offered fall and spring.

**MUEL 1115-1. Piano Class 1.** Introduces the keyboard and music reading for nonmusic majors with no prior keyboard experience. Studies very easy classical and pop repertoire. Prereq., no prior keyboard experience or instructor consent. Formerly EMUS 1115.

**MUEL 1125-1. Piano Class 2.** Continuation of MUEL 1115. Focuses on development of music reading. Studies technical patterns, easy classical and pop repertoire, and improvisation. Prereq., MUEL 1115. Formerly EMUS 1125.

**MUEL 1145 (2-4). Guitar Class.** A systematic study of the beginning literature and technique of the classical guitar with an emphasis on reading music. Designed for nonmusic majors with no prior musical experience. Formerly EMUS 1145.

**MUEL 1155-2. Intermediate Guitar.** Studies the intermediate literature and technique of the classical and popular guitar. Emphasis on reading standard notation and chord charts. Designed for non-music majors. May be repeated up to 6 total credit hours. Prereq., MUEL 1145 or instructor consent. Formerly EMUS 1155.

**MUEL 1184-1. Voice Class.** Involves basic vocal technique and easy solo repertoire taught through a group medium, for beginner and intermediate level students. May be repeated up to 6 total credit hours. Recommended prereq., ability to read music. Formerly EMUS 1184.

**MUEL 1416-2. Introduction to Hand Percussion.** Studies the literature and technique of hand percussion. Emphasizes African and Latin percussion techniques. Designed for non-music majors. May be repeated up to 6 total credit hours. Formerly EMUS 1416.

**MUEL 1832-3. Appreciation of Music.** Provides a basic knowledge of primarily Western music literature and development of discriminating listening habits. Restricted to nonmusic majors. Formerly EMUS 1832. Approved for arts and sciences core curriculum: literature and the arts. Offered fall and spring.

**MUEL 2184-1. Voice Class.** Continuation of MUEL 1184, with more advanced repertoire and vocal techniques. May be repeated up to 6 total credit hours. Prereq., MUEL 1184. Formerly EMUS 2184.

**MUEL 2752-3. Music in American Culture.** Offers a stylistic and historical examination of trends that have influenced present-day music in the U.S. Formerly EMUS 2752. Approved for arts and sciences core curriculum: United States context. Offered fall and spring.

**MUEL 2762-3. Music and Drama.** Explores techniques used in combining music and dramatic arts through examples from musical and dramatic literature of the West from circa 1000 to present. Formerly EMUS 2762. Offered spring only.

**MUEL 2772-3. World Musics.** Highlights music outside Western art tradition, using current ethnomusicological materials. Spring semester focuses on musical cultures of the Americas, Africa, and Europe; fall semester focuses on musical cultures of Asia and Oceania. May be repeated up to 6 total credit hours. Formerly EMUS 2772. Approved for arts and sciences core curriculum: human diversity.

**MUEL 2842-3. American Musical Theatre.** Provides an overview of the role of musical theatre in U.S. culture, emphasizing the 20th century Broadway musical. Formerly EMUS 2842.

**MUEL 2852-3. Music of the Rock Era.** Examines popular music, concentrating on the U.S. after 1950. Considers precursor styles (e.g., blues folk) and contributions to the new rock style; discusses the evolution of rock style from 1960 through the 1990s. Formerly EMUS 2852. Approved for the arts and sciences core curriculum: literature and the arts. Offered spring only.

**MUEL 2862-3. American Film Musical, 1926–1954.** Examines the development of filmed musicals from the beginning of sound movies through the Golden Age of Musicals. Emphasizes analysis and relationships of characters, songs, and incidental music. Formerly EMUS 2862. Approved for arts and sciences core curriculum: literature and the arts.

**MUEL 3051-2. Basic Composition.** Introduces the processes, materials, and forms of composition through the writing and performance of short musical works. Open to any student who already has rudimentary musical knowledge. Formerly EMUS 3051.

**MUEL 3642-3. History of Jazz.** Studies the distinctly American art form of jazz music from its origins to the present, including the various traditions, practices, historical events, and people most important to its evolution. For nonmusic majors. Formerly EMUS 3642. Offered fall and spring.

**MUEL 3822-3. Words and Music.** Explores the interaction between words and music in song. Students will consider how such features as rhyme, rhythm, tone, and the connotations of particular words contribute to meaning in poetry; how rhythm, tempo, dynamics, mood, and instrumentation contribute to meaning in music; and how words and music coalesce in song to make a new meaning. Restricted to nonmusic majors. Formerly EMUS 3822. Approved for arts and sciences core curriculum: literature and the arts.

**MUEL 3832-3. Music in Literature.** Addresses literature that seeks either to explore the meaning of music or to make music out of words. Students will consider how musical concepts and techniques can be incorporated into poetry and prose, and will analyze the roles that writers have attributed to music in society, politics, and the life of the individual. Restricted to nonmusic majors. Formerly EMUS 3832. Approved for arts and sciences core curriculum: literature and the arts.

**MUEL 3872-3. Music in the Rock Era: Special Topics in Heavy Metal.** Explores, discuss, debate and develop deeper understanding of Heavy Metal. Included are study of musical style characteristics and lyrical content, innovative performers, unifying elements of Heavy Metal culture and the diversity within it, and its role in the larger Rock and societal contexts. Issues of gender, religion, and sexuality in the Heavy Metal construct are also discussed.

**MUEL 4012 (3-6). African Music.** Studies the musics, dances, and cultures of various peoples of Africa. Includes African diaspora music and Afro-pop. Formerly EMUS 4012.

## Music

### Theory and Composition

**MUSC 1081-3. Intensive Music Theory for Music Majors.** Introduces tools used in notating, performing, creating, and listening to music. Coreq., MUSC 1121. Open to music majors only. Offered fall only.

**MUSC 1101-2. Semester 1 Theory.** Introduces the fundamentals of diatonic harmony and voice leading, focusing on four-voice writing and analysis of excerpts from music literature. For music majors only. Offered fall only.

**MUSC 1111-2. Semester 2 Theory.** Continuation of MUSC 1101. Covers principles of harmony and voice leading, using all common diatonic triads and seventh chords. Introduces secondary dominants, modulation, contrapuntal chord functions, and elementary structural analysis of excerpts from music literature. Prereq., MUSC 1101. Offered spring only.

**MUSC 1121-1. Aural Skills Lab, Semester 1.** Focuses on sight singing, rhythm, and dictation of diatonic melodies in major and minor keys (treble, alto, and bass clefs). Covers identification of scale types, intervals, triads, and dominant seventh chords. Studies harmonic dictation using chords from MUSC 1101. Offered fall only.

**MUSC 1131-1. Aural Skills Lab, Semester 2.** Acquaints students with sight singing in major and minor keys (treble, alto, tenor, and bass clefs). Includes dictation of one- and two-voice examples. Studies harmonic dictation using vocabulary from MUSC 1111. Considers detection of pitch and rhythm errors in performed examples. Prereq., MUSC 1121. Offered spring only.

**MUSC 2071-2. Instrumentation.** Introduces and studies the instruments of the orchestra and problems of scoring for diverse choirs and full orchestra. Prereqs., MUSC 2101 and 2121. Offered spring only.

**MUSC 2081-2. Prepared for the Soundcheck.** Provides an overview of the recording process from the performer's perspective from soundcheck through final mastering. Uses recorded material from in-class sessions. Examines differing approaches to recording as well as current technologies.

**MUSC 2091-2. Recording Techniques.** Provides hands-on training in various audio recording techniques, acoustics, and sound reinforcement, studio maintenance, and troubleshooting. Real-world experience is gained through individual recording projects and College of Music events. Prereq., MUSC 2081 or instructor consent.

**MUSC 2101-2. Semester 3 Theory.** Continuation of MUSC 1111. Reviews secondary dominants, secondary leading-tone chords, and modulation. Covers dissonance and chromaticism, including modal mixture, seventh chords with added dissonance, Neapolitan sixth chord, and augmented sixth chords. Provides structural analysis of musical excerpts. Prereq., MUSC 1111. Offered fall only.

**MUSC 2111-2. Semester 4 Theory.** Continuation of MUSC 2101. Focuses on advanced chromaticism including modal mixture, altered dominants, voice leading, and chromatic harmony in larger contexts. Examines impressionism and jazz. Also involves composition projects. Prereq., MUSC 2101. Offered spring only.

**MUSC 2121-1. Aural Skills Lab, Semester 3.** Continuation of MUSC 1131. Studies sight singing of chromatic melodies in major and minor keys (in four clefs). Includes dictation of one- through three-voice examples. Studies harmonic dictation using vocabulary from MUSC 2101. Considers detection of pitch and rhythm performance errors. Prereq., MUSC 1131. Offered fall only.

**MUSC 2131-1. Aural Skills Lab, Semester 4.** Continuation of MUSC 2121. Studies sight singing of chromatic and atonal melodies. Includes dictation of one- through three-voice examples. Identifies sonorities studied in MUSC 2111. Considers detection of pitch and rhythm performance errors. Prereq., MUSC 2121. Offered spring only.

**MUSC 3051-2. Beginning Composition.** For noncomposition majors. Introduction to the craft of musical composition with analysis and writing in various styles. Open to music majors only.

**MUSC 3061-2. Jazz Improvisation I.** Develops skills in jazz improvisation through practical application of chord/scale relationship, transcription, repertoire, and analysis. Open to all instruments. Offered fall only.

**MUSC 3071-2. Jazz Improvisation II.** Continues and expands upon the material presented in MUSC 3061. Reinforcement of ability to create an improvised melody in a range or harmonic contexts including blues, bebop, modal jazz, free jazz and other styles. Prereq., MUSC 3061 or instructor consent. Offered fall only.

**MUSC 3081-3. Jazz Theory and Aural Foundations.** Presents the grammar and syntax of jazz. Acquaints the student with the language of jazz improvisation and various jazz styles. The musician's most valuable tool—the ear—is developed through an in-depth analytical study of jazz masters through harmonic dictation/identification. Prereq., MUSC 2101. Offered spring only.

**MUSC 4001-2. New Musical Styles and Practices.** Studies current styles of composition and theories that underlie them. Students write (and perform, if possible) short representative exercises in recent musical idioms. Prereq., MUSC 4071. Offered spring of alternating years.

**MUSC 4011-2. 16th Century Counterpoint.** Studies the style of Palestrina and his contemporaries through analysis, species counterpoint exercises, and composing in the style. Prereqs., MUSC 2111 and 2131. Offered every other year.

**MUSC 4021-2. 18th Century Counterpoint.** Provides a stylistic study of main contrapuntal genres of the period including invention, suite, and fugue. Provides a foundation in species counterpoint; stresses analysis and composing in the style. Prereqs., MUSC 2111 and 2131. Offered every other year.

**MUSC 4031-2. Jazz Arranging 1.** Study of notation, score layout, transpositions, basic harmonic and melodic analysis, basic chord voicings, and composition for a small and large jazz ensemble. Use of notation software such as Finale or Sibelius. Prereqs., MUSC 2111 and 2131. Recommended prereq., MUSC 3081. Offered fall only.

**MUSC 4041-2. Orchestration.** Studies advanced orchestration techniques through score analysis and student projects. Prereq., MUSC 2071 or instructor consent. Offered fall only.

**MUSC 4061-2. Tonal Analysis.** Surveys tonal analytical techniques and forms of tonal music, including binary forms, sonata forms, ternary forms, rondo (and others) through study of selected works from the 18th and 19th centuries. Prereqs., MUSC 2111 and 2131. Offered fall only.

**MUSC 4071-2. Post-Tonal Theory and Analysis.** Focus on theory and analysis of post-tonal literature pre-1945. Prereqs., MUSC 2111 and 2131. Offered spring only.

**MUSC 4081-3. Introduction to Music Technology.** Topics include basic synthesis, musical instrument digital interface (MIDI) sequencing, and music notation by computer. Offered fall and spring.

**MUSC 4091-2. Jazz Arranging 2.** Continuation and expansion of studies in MUSC 4031. Survey and analysis of major composers and arrangers of the idiom. Course focuses on creating several projects for a large jazz ensemble. Prereq., MUSC 4031. Recommended prereq., MUSC 3081. Offered spring of odd-numbered years.

**MUSC 4101 (1-3). Theory and Aural Skills Review.** Reviews tonal harmony, voice leading, and essential aural skills. Includes diatonic triads and seventh chords, modulation, chromaticism, and structural analysis of representative compositions. Prepares graduate students for more advanced work in music theory. Students may register for aural skills only (1 credit), theory only (2 credits), or both theory and aural skills (3 credits). May not be taken pass/fail. For graduate students only. Offered summer and fall.

**MUSC 4111-2. Composing at the Computer.** Discover strategies and techniques for generating and manipulating sound at the computer. Student projects will include compositions, soundscapes, ambient environments, and soundtracks for multimedia. Available to students without prior experience with computer music or composition. Prereq., MUSC 4081.

**MUSC 4191-2. Advanced Recording.** Study of advanced recording techniques and concepts beyond those covered in MUSC 2091 involving multiple microphones for ensemble concerts and recording sessions within and outside of the College of Music. Prereq., MUSC 2091. Offered spring of even-numbered years.

**MUSC 5041-2. Advanced Orchestration.** Provides an advanced study of orchestration techniques through score analysis and student projects. Offered fall only.

**MUSC 5061-3. Advanced Tonal Analysis.** Surveys tonal analytical techniques. Prereq., passed general written theory and aural skills prelim exam, or completed remediation. Offered fall only.

**MUSC 5071-3. Post-tonal Theory and Analysis I.** Focuses on theory and analysis of post-tonal literature pre-1945. Prereq., passed general written theory and aural skills prelim exam, or completed remediation. Offered spring only.

**MUSC 5081-3. Applications in Music Technology.** Presents advanced strategies for applying computer technology in several musical disciplines. Emphasizes the use of technology in composition, music theory, and music education. Offered fall only.

**MUSC 5091-3. Contemporary Jazz Theory.** Studies contemporary approaches to jazz improvisation and composition. Analysis of innovative composition and improvisation strategies for integration of material into a personal vocabulary are explored. Prereq., MUSC 3081 or instructor consent. Offered spring only.

**MUSC 5121-3. Advanced Topics in Music Technology.** Conducts advanced research in techniques and tools of music technology. Topics vary from term to term and may include: user interfaces for computer music; advanced sound design; digital modeling of acoustic sounds; computer-aided analysis of sound; modeling music intelligence in real time. Lectures and work sessions will support student projects. May be repeated up to 9 total credit hours. Prereq., MUSC 5081 or instructor consent required.

**MUSC 5151-3. Topics in Music Analysis.** Analytical study of a specific topic to be determined by the instructor (e.g., German Lieder, Bartok quartets, tonal rhythm, Schenker, etc.). Study published analyses representing a variety of methodologies, and produce original analyses. Prereq., passed general written theory and aural skills prelim exam, or completed remediation. Rec-

ommended prereqs., MUSC 5061, 5071, as appropriate to topic or instructor consent.

**MUSC 6041-3. Orchestration since 1940.** Studies significant and distinctive orchestration techniques of the 20th century, concentrating on works written since 1940. Restricted to doctoral students.

**MUSC 6051-3. Pedagogy of Music Theory.** Studies methods and materials for teaching undergraduate music theory, aural skills, and analysis. Prereq., passed general written theory and aural skills prelim exam, or completed remediation.

**MUSC 6801-3. Advanced Topics in Music Theory.** Intensive study of a specialized topic in theory and analysis. Students will be guided in critical reading and analysis, class presentations, and independent research. Prereqs., graduate preliminary exams passed, and 6 credit hours of graduate-level theory. Restricted to MUSD and MUAD students.

**MUSC 7801-3. Doctoral Seminar in Music Theory.** Provides advanced study in theory. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires a major paper or project. Prereq., passed general written theory and aural skills prelim exam, or completed remediation.

## Musicology

**MUSC 1802-3. Introduction to Musical Styles and Ideas.** Introduces the study of music including bibliographic, listening, score reading, critical reading, and writing skills; music terminology; a survey of selected music genres (symphonic and chamber music); and building of general music repertory. Offered fall only.

**MUSC 2772-3. World Musics.** Study of music outside western art tradition, using current ethnomusicological materials and methodologies. Spring semester focuses on musical cultures of Africa, the Americas, and Europe; fall semester focuses on musical cultures of Asia and Oceania.

**MUSC 2782-3. World Musics Survey—Africa, Europe, and the Americas.** Use current ethnomusicological materials and methods in the study of music outside the Western art tradition. Usually taught in the spring, MUSC 2782 focuses on music cultures of Africa, Europe, and the Americas.

**MUSC 3642-3. History of Jazz.** Studies the distinctly American art form of jazz music from its origins to the present, including the various traditions, practices, historical events and people most important to its evolution. Offered fall only.

**MUSC 3802-3. History of Music 1.** Surveys Western art music with stylistic analysis of representative works from all major periods through the Baroque. See also MUSC 3812. Prereq., MUSC 2111.

**MUSC 3812-3. History of Music 2.** Surveys Western art music with stylistic analysis of representative works from all major periods after the Baroque. See also MUSC 3802. Prereq., MUSC 2111.

**MUSC 4012-3. African Music.** Studies the musics, dances, and cultures of various peoples of Africa. Includes African diaspora music and Afro-pop. Offered fall only.

**MUSC 4112-3. Ethnomusicology.** Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures. Prereq., MUSC 2772. Restricted to juniors/seniors.

**MUSC 4142-3. American Indian Music.** Studies Native North American musical cultures, with an emphasis on music as an integral part of religious expression and community life. Restricted to juniors/seniors.

**MUSC 4152 (3). East Asian Music.** Surveys the development of music in Japan, China and Korea through the in-depth study of particular styles of traditional music. The course emphasizes the study of music and culture, particularly music's relationship to religion, politics, language, literature, dance and theatre. Recommended prereq., MUSC 2772.

**MUSC 4712-3. Renaissance Music.** Provides repertory and analysis of polyphonic music 1400–1600. Prereq., MUSC 3802. Same as MUSC 5712.

**MUSC 4752-3. Women Composers.** Examines the historical contributions of women composers, principally in the western tradition. Investigates the

reception of women's work by historians, critics, audiences, performers, and patrons. Restricted to juniors/seniors.

**MUSC 4772-3. History of Opera.** Surveys operatic literature from early Baroque to contemporary productions. Prereq., MUSC 3812. Same as MUSC 5772.

**MUSC 4802-3. Studies in 20th Century Music.** Offers intensified work in history of music in the 20th century. Topics vary from year to year. Prereq., MUSC 3812. Restricted to juniors/seniors. Same as MUSC 5802.

**MUSC 4812-3. Symphonic Literature.** Studies literature for orchestra, band, and other symphonic ensembles, including pre-Classical, Classical, Romantic, and 20th century.

**MUSC 4852-3. 17th and Early 18th Century Music.** Studies style and repertory of music from 1580 to 1750. Prereq., MUSC 3812 or instructor consent.

**MUSC 4872-3. Late 18th and 19th Century Music.** Examines music and writings about music during the Classical and Romantic eras of the Western tradition, 1750–1900. Emphasizes historical and stylistic analysis and current musicological research. Recommended prereq. or coreq., MUSC 3812.

**MUSC 4892-3. Latin American Music.** Explores music of cultures south of the United States, emphasizing the relationships of music and culture in folk, popular, and art styles. Restricted to juniors/seniors. Same as MUSC 5892.

**MUSC 5002-3. Proseminar in Historical Musicology.** Prepares students to pursue independent research in the history of music. Meeting as a seminar, the course focuses on the nature of evidence, methods and tools of research, and theoretical or historiographic issues.

**MUSC 5012-3. West African Music and Dance.** Studies musical and dance traditions and current practices. Prereq., MUSC 4012 or instructor consent. Same as DNCE 5054.

**MUSC 5112-3. Proseminar in Ethnomusicology.** Examines the definition, scope, and methods of ethnomusicology, the discipline that focuses on approaches to the study of music theory, history, and performance practices of world cultures. Restricted to graduate students who have passed or remediated the World Music portion of their Musicology preliminary exams.

**MUSC 5142-3. American Indian Music.** Studies Native North American musical cultures, emphasizing music as an integral part of religious expression and community life. Restricted to graduate music majors.

**MUSC 5642-3. Jazz History and Literature.** Studies musical trends and cultural forces influencing jazz, with analysis of scales, improvisational styles, melodic and motivic variations, transcriptions, and orchestrations from significant periods in its history. Prereq., MUSC 3642 or instructor consent. Offered spring only.

**MUSC 5712-3. Renaissance Music.** Provides a repertory and analysis of polyphonic music 1400–1600. Same as MUSC 4712.

**MUSC 5742-3. Performance Practice of Early Music.** Examines instrumental and vocal performance practices through the 18th century. Topics may vary from year to year.

**MUSC 5752-3. Women Composers.** Examines the historical contributions of women composers, principally in the western tradition. Investigates the reception of women's work by historians, critics, audiences, performers, and patrons.

**MUSC 5762 (3-4). History of Choral Literature.** Provides a seminar in analysis of musical style and history of choral repertory. Those wishing review of literature and repertory may enroll for 4 hours credit.

**MUSC 5772-3. History of Opera.** Restricted to graduate students. Same as MUSC 4772.

**MUSC 5802-3. Studies in 20th Century Music.** Prereq., Graduate standing. Same as MUSC 4802.

**MUSC 5812-3. Symphonic Literature.** Studies literature for orchestra, band, and other symphonic ensembles including pre-Classical, Classical, Romantic, and 20th century.

**MUSC 5822-3. Ancient and Medieval Music.** Surveys sources from the ancient Greeks to the early Christian era and music from the 8th to the 15th century.



**MUSC 5832-3. Studies in American Music.** Offers intensified work in folk, popular, and art music of the United States.

**MUSC 5842-3. Music Aesthetics.** Surveys various philosophies of music in writings of philosophers, psychologists, sociologists, composers, critics, and historians. May be repeated up to 12 total credit hours.

**MUSC 5852-3. 17th and Early 18th Century Music.** Provides a repertory and analysis of polyphonic music, 1570-1750.

**MUSC 5872-3. Late 18th and 19th Century Music.** May be repeated up to 12 total credit hours. Same as MUSC 4872.

**MUSC 5882-3. Studies in 18th and 19th Century Music.** Meets as a seminar and examines selected topics in Classic and Romantic music, 1750-1900. Topics vary from year to year.

**MUSC 5892-3. Latin American Music.** Restricted to graduate students. Same as MUSC 4892.

**MUSC 6822-3. Advanced Studies in Musicology.** Intensive study of a specialized topic in musicology. Students will be guided in critical reading, historical or ethnographic issues, analysis, oral presentations, and independent research. May be repeated up to 6 total credit hours. prereq., MUSC 5708. Restricted to MUAD or MUSD majors.

**MUSC 7822-3. Seminar in Musicology.** Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. Restricted to MUSD majors. See also MUSC 7832. Offered fall only.

**MUSC 7832-3. Seminar in Musicology.** Required of all musicology majors before completion of comprehensive examinations. A different research area is designated each semester. See also MUSC 7822. Offered spring only.

## Music Education

**MUSC 2103-3. Introduction to Music Education.** Provides an overview of basic principles and practices of the music education profession. Explores public school music teaching through class discussions, directed observations, and a supervised field experience. Offered fall only.

**MUSC 3013-1. String Class.** For music education majors with choral/general emphasis. Develops basic performance skills on two or more string instruments. Addresses teaching strategies and other specialized topics related to string instruction. Offered fall only.

**MUSC 3023-1. Woodwind Class.** For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.

**MUSC 3033-1. Brass Class.** For music education majors with choral or choral/general emphasis. Develops basic performance skills on two or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.

**MUSC 3133-2. Teaching General Music I.** Provides an overview of general music teaching with emphasis on developmentally appropriate strategies and materials. Required for all music education majors as partial fulfillment of course work leading to K-122 music licensure. Prereq., MUSC 2103. Offered spring only.

**MUSC 3153-2. Teaching Woodwind Instruments.** For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more woodwind instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate woodwind instruction. Offered spring only.

**MUSC 3163-2. Teaching String Instruments.** For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more string instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate string instruction. Offered fall only.

**MUSC 3193-2. Vocal Pedagogy and Literature for Young Voices.** Provides an overview of vocal anatomy/function, care of the voice, vocal repertoire, teaching strategies, and other specialized topics related to singing instruc-

tion in both private studio and public school choral settings. Fall section for instrumentalists; spring section for vocalists.

**MUSC 3223-2. Teaching Brass Instruments.** For music education majors with instrumental or instrumental/general emphasis. Develops basic performance skills on three or more brass instruments. Addresses teaching strategies and other specialized topics related to beginning and intermediate brass instruction. Offered spring only.

**MUSC 3253-2. Jazz Techniques for the Music Educator.** Prepares the music educator for successful experiences teaching jazz at the secondary level. Students gain insights into performance and rehearsal techniques for the instrumental jazz ensemble. Explores approaches for teaching jazz theory, improvisation, and selecting literature for young students. Own instrument required for certain classes. Recommended prereqs., MUSC 1111 and 2103. Offered spring only.

**MUSC 3273-2. String Pedagogy and Literature.** Examines instructional methods/materials and pedagogical approaches appropriate for beginning to advanced string students in private studio, small ensemble, or large ensemble contexts. Topics may include group teaching strategies, as well as contemporary approaches including Rolland and Suzuki. Recommended prereqs., MUSC 2103 and 3163. Offered spring only.

**MUSC 3363-2. Marching Band Techniques.** Helps develop the skills needed to administer and teach all aspects of a contemporary high school marching band. Includes drill conception and design, instruction, organization, and administration. Prereqs., MUSC 2103 and EMUS 1287. Offered fall only.

**MUSC 4103-1. Introduction to Student Teaching.** Represents the first half of the professional internship year. Familiarizes students with the schools and music programs in which they plan to student teach. Music placements may consist of elementary and high school, elementary and middle school, or middle school and high school. Prereqs., MUSC 4113, 4313, or 4443; and EDUC 3023.

**MUSC 4113-3. Teaching General Music 2.** Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental, and speech-based arrangements. Prereqs., MUSC 2103 and 3133. Offered fall only.

**MUSC 4123-3. Student Teaching Practicum.** Offers practice teaching under the guidance of a master music teacher. Elementary level. Prereq., MUSC 4103.

**MUSC 4133-3. Student Teaching Practicum.** Offers practice teaching under the guidance of a master music teacher. Secondary level. Prereq., MUSC 4103.

**MUSC 4143-2. Developing Children's Choirs.** Examines the musical skills, teaching techniques, and administrative procedures necessary for developing a children's choir. Offered fall of even-numbered years. Prereq., MUSC 2103. See MUSC 5143.

**MUSC 4153-1. Percussion Class and Pedagogy.** Required of all music education majors. Presents knowledge and skills necessary for music educators to teach young students, including a general understanding of the techniques used in playing and teaching percussion instruments in the school music program. Offered fall only.

**MUSC 4163-2. Choral Literature for School Ensembles.** Examination of literature, materials, and methods appropriate for teaching choral music in secondary schools. Offered fall of odd-numbered years. Prereq., MUSC 2103.

**MUSC 4193-1. Student Teaching Seminar.** Required for all music student teachers. Addresses topics of concern to beginning teachers including classroom management, interpersonal skills, legal issues, job search strategies, and teaching portfolio development. Prereq., MUSC 4103.

**MUSC 4203-1. Music Methods Practicum.** Taken concurrently with either MUSC 4113, 4313, or 4443. Provides students with opportunities to observe and practice the use of various teaching techniques and relate them to concepts presented in the methods course. Students consult with the instructor to determine appropriate placements in schools. Prereq., MUSC 2103. Coreq., MUSC 4113, 4313, or 4443.

**MUSC 4313-3. Teaching Choral Music.** Examines choral music curricula, instructional materials, and teaching techniques appropriate for secondary

choral settings. Also addresses administrative strategies for choral music programs. Prereq., MUSC 2103. Same as MUSC 5313. Offered spring only.

**MUSC 4443-3. Teaching Instrumental Music.** Examines instrumental music curricula, instructional materials, and teaching techniques appropriate for rehearsal, class, and lesson settings. Also addresses administration strategies for instrumental music programs. Prereq., MUSC 2103. Same as MUSC 5442. Offered spring only.

**MUSC 4583-2. Inclusive Music Classroom.** Surveys strategies necessary for teaching music to all students, including those with special needs. Offered fall of even-numbered years. Prereqs., MUSC 2103 and 3133. Recommended prereq., MUSC 4113. Same as MUSC 5583.

**MUSC 5103-3. Teaching General Music.** Provides an in-depth examination of teaching and learning processes in the elementary general music classroom, based on the integration of child development and musical development theories with content and delivery skills appropriate for K-5 general music classrooms. Students implement and evaluate music instruction, design curricular projects, and build a repertoire of vocal, instrumental, and speech-based arrangements. Restricted to graduate students in music education. Offered fall only.

**MUSC 5143-2. Developing Children's Choirs.** Restricted to graduate students in music education. Same as MUSC 4143.

**MUSC 5183-2. Research in Music Teaching.** Introduces basic descriptive, experimental, and qualitative research methods, including sampling, design, data collection, and analysis. Students review published music research and conduct one original research study. Restricted to graduate students in music education. Offered fall only.

**MUSC 5273-2. Comprehensive String Pedagogy.** Comparative study and application of the principles of string teaching. In-depth analysis of individual instrument pedagogy and application to advanced studio and class teaching. Historical survey of major violin, viola, cello, and double bass pedagogues. Includes apprenticeship teaching. Restricted to graduate students. Offered fall only.

**MUSC 5313-3. Teaching Choral Music.** Restricted to graduate students in music education. Same as MUSC 4313. Offered spring only.

**MUSC 5443-3. Teaching Instrumental Music.** For graduate music education majors. Same as MUSC 4443. Offered spring only.

**MUSC 5583-2. The Inclusive Music Classroom.** For graduate music education majors. Same as MUSC 4583.

**MUSC 6113-2. Foundations of Music Education.** Surveys historical and philosophical bases of contemporary music education. Restricted to graduate students in music education. Offered fall only.

**MUSC 6133-2. Comprehensive Musicianship through Performance.** Explores curricular models for music education. Emphasizes comprehensive musicianship and standards-based frameworks for curriculum and development. Restricted to graduate students in music education. Offered spring of even-numbered years.

**MUSC 6193-1. Selected Studies in Music Education.** May be repeated up to 12 total credit hours. Prereq., consent of instructor and music education chair.

**MUSC 6203-2. Psychology of Music Learning.** Provides an overview of psychological concepts relevant to music teaching and learning. Topics include learning theories, selected individual difference variables (motivation, anxiety, creativity, and personality), physiological structures related to hearing, psychoacoustics, and approaches to examining musical ability (e.g. brain research, music aptitude, and skill acquisition). Restricted to graduate students. Offered spring only.

**MUSC 6213-2. Assessment of Music Learning.** Provides an overview of traditional and contemporary approaches to music assessment. Topics include psychometrics, standardized tests, test construction, grade reports, and student portfolios. Restricted to graduate students in music education. Offered spring of even-numbered years.

**MUSC 6223-2. Sociology of Music Education.** Studies sociological perspectives related to music education. Topics include functions and uses of music; taste and preference; teacher and student role development; and

cultural perspectives on music learning. Recommended prereq., MUSC 6113. Restricted to graduate students in music education. Offered fall of even-numbered years.

**MUSC 7103-3. Historical Research in Music Education.** Topics include oral history, archival collections, data verification, and critiquing/publishing research. Students conduct one original research study. May be repeated up to 12 total credit hours. Restricted to doctoral students in music education. Offered spring of odd-numbered years.

**MUSC 7113-3. Quantitative Research in Music Education.** Topics include sampling, questionnaire development, research design, intermediate and advanced statistics, presenting/publishing research, and research ethics. Students conduct an original research study. Restricted to doctoral students in music education. Offered spring of even-numbered years.

**MUSC 7143-3. Qualitative Research in Music Education.** Topics include qualitative research traditions, site and participant selection, data collection and analysis methods, quality standards, and research ethics. Students conduct an original research study. Restricted to doctoral students in music education. Offered fall of odd-numbered years.

**MUSC 7203-3. Doctoral Seminar in Music Education.** Provides an advanced study of topics central to the music education profession. Requires class presentations and a major paper or project. Restricted to doctoral students in music education. Offered fall of even-numbered years.

## Voice

**MUSC 1544-1. Italian Diction.** Designed for the understanding of lyric Italian diction, the international phonetic alphabet, and its application to classical singing. Required for Freshmen BM voice majors. Offered fall only.

**MUSC 1554-1. English Diction.** Designed for the understanding of lyric English diction, the international phonetic alphabet, and its application to classical singing as well as various musical styles of English classical voice literature. Prereq., MUSC 1544. Required for Freshmen BM voice majors.

**MUSC 3444-1. French Diction.** Designed for the understanding of lyric French diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of French classical vocal literature. Prereq., MUSC 1554. Recommended prereq., MUSC 3464. Required of Junior BM voice majors.

**MUSC 3464-1. German Diction.** Designed for the understanding of lyric German diction, the international phonetic alphabet, and its application to classical singing, as well as various musical styles of German classical vocal literature. Prereq., MUSC 1554. Required of sophomore BM voice majors.

**MUSC 5444-2. Vocal Pedagogy.** In depth study of the physiology, acoustics, and health aspects of the singing voice. Recommended for all graduate students in voice.

**MUSC 5454-2. Repertory for Young Voices.** Survey of the solo repertoire for young voices, the physiological aspects of mutational voices, techniques of vocalizing young voices, and class voice procedure.

**MUSC 5464-2. French Song Literature.** Provides an extensive analytical and historical discussion of French song literature styles, from the 12th century to the present.

**MUSC 5484-2. Graduate Seminar in Vocal Pedagogy.** A thorough investigation of the challenges of studio voice pedagogy, including corrective techniques, psychological philosophies, and video analysis of student teaching. Examination and evaluation of comparative methodologies of vocal technique. Prereq., MUSC 5444 or instructor consent required.

**MUSC 5564-2. German Song Literature.** Provides an extensive analytical and historical discussion of German song literature styles, from the 18th century to the present.

**PMUS 1184-1. Voice Class.** Involves basic vocal technique and easy solo repertoire taught through a group medium, for beginner and intermediate level students. May be repeated up to 6 total credit hours. Restricted to MUSC majors.

**PMUS 2184-1. Voice Class.** Continuation of PMUS 1184, with more advanced repertoire and vocal techniques. May be repeated up to 6 total credit hours. Prereq., PMUS 1184. Restricted to MUSC majors.

**PMUS 3167-3. Opera Theatre Stagecraft.** Introduction to the processes, materials, and equipment used in theatrical production. Lecture and lab requirements. Lab experiences include introductory work in the opera scenery, property, costume, and electrical shops.

**PMUS 4137-1. Opera Theatre 1.** Addresses issues related to young artist development. Areas of concentration include (but are not limited to) acting technique, resume preparation, audition technique, scene analysis, and role preparation. The acting technique is addressed in this course through textbook reading and exercise. May be repeated up to 12 total credit hours.

**PMUS 4147-1. Opera Theatre 2.** Continuation of PMUS 4137. Further scene analysis and movement exercises are addressed in this class. May be repeated up to 12 total credit hours. Prereq., PMUS 4137.

**PMUS 4157-1. Opera Practicum.**

**PMUS 4167 (1-3). Opera Theatre Lab.** Advanced work in the scenery, property, costume, and electrical shops in opera performance. Additional experiences may include positions with opera run crews, the box office, or other supporting areas. May be repeated up to 12 total credit hours.

**PMUS 4497 (1-2). Vocal Repertoire Coaching.** Group coaching class to prepare for voice recitals as well as to learn vocal repertoire including historical background, composers, styles, and poetic interpretation. May be repeated up to 12 credit hours.

**PMUS 5137-2. Opera Theatre 1.** Addresses issues related to young artist development at the graduate level. Areas of concentration will include (but are not limited to) acting technique, resume preparation, audition technique, scene analysis, and role preparation. Students will participate in acting and improvisation exercises, mock auditions, and will be assigned monologues. Students will present arias in class from the operatic literature for both audition and scene analysis purposes. May be repeated up to 12 total credit hours.

**PMUS 5147-2. Opera Theatre 2.** Continuation of PMUS 5137. May be repeated up to 12 total credit hours. Prereq., PMUS 5137.

**PMUS 5497 (1-2). Vocal Repertoire Coaching.** Group coaching class to prepare for voice recitals as well as to learn vocal repertoire including historical background, composers, styles, and poetic interpretation. Class may fulfill voice literature requirements when appropriate classes are not offered. Also available: weekly individual coaching to prepare for voice recitals and other projects. Diction, musical styles, and interpretation (music and text) are the main focus of this course. May be repeated up to 12 credit hours. For graduate voice students and collaborative pianists.

## Organ and Church Music

**MUSC 4255-2. Service Playing Techniques.** Thoroughly studies music of liturgical and non-liturgical services. Includes techniques of hymn playing and accompanying, and directing from the console. Same as MUSC 5255.

**MUSC 4285-3. Organ Survey.** Historically surveys organ music and organ construction, studying both forms of composition and types of organ for which the music was originally written. See also MUSC 4295. Same as MUSC 5285.

**MUSC 4295-3. Organ Survey.** Historically surveys organ music and organ construction, studying both forms of composition and types of organ for which the music was originally written. See also MUSC 4285. Same as MUSC 5295.

**MUSC 5255-2. Service Playing Techniques.** Same as MUSC 4255.

**MUSC 5285-3. Organ Survey.** Same as MUSC 4285.

**MUSC 5295-3. Organ Survey.** Same as MUSC 4295.

## Piano

**MUSC 1325-1. Piano Sight Reading.** Studies techniques for improving sight-reading skills at the keyboard, with practical work in solo, ensemble, and choral literature. Also covers score reading and transposition. Restricted to piano majors instructor consent. Offered fall only.

**MUSC 2325-2. Applied Harmony for the Keyboard.** Provides an intensive study and application of the harmonic structure of music in a variety of keyboard skills: figured bass realization, chord progressions, harmonization, improvisation, transposition, on-sight harmonic analysis, and playing by ear. Prereqs., MUSC 1111, 1131, and 1325. Offered fall only.

**MUSC 2365-2. Introduction to Accompanying.** An overall study in the art of working with instrumentalists and singers including repertoire and orchestral reductions. Requires performance with a student instrumentalist or singer to be critiqued and coached by class and instructor. Prereq., piano major or instructor consent. Offered spring only.

**MUSC 3345-2. Piano Pedagogy 1.** Discusses teaching philosophies, objectives, and procedures. Examines and evaluates methods and materials. Studies practical aspects with which the private teacher is concerned. May be repeated up to 12 total credit hours. Offered fall of even-numbered years.

**MUSC 3355-2. Piano Pedagogy 2.** Materials and techniques for teaching piano with a focus on the intermediate level student. May be repeated up to 12 total credit hours. Offered only in spring of odd-numbered years.

**MUSC 3445-1. Practicum in Piano Teaching: Elementary Level.** Provides practical experience teaching piano at the elementary and early intermediate levels under faculty supervision. May be repeated up to 2 total credit hours. Recommended prereqs., MUSC 3345, 3355. Restricted to MUSC, MUSA majors.

**MUSC 4325-2. Keyboard Literature 1.** Surveys keyboard music from 1600 to 1830. Offered fall semester of even-numbered years.

**MUSC 4335-2. Keyboard Literature 2.** Surveys keyboard music from 1830 to the present. Offered spring semester of odd-numbered years.

**MUSC 4405-2. Basso-Continuo Accompaniment.** Studies the history, theory, and practice of Basso-continuo accompaniment. Provides practical instruction in realizing harmony from a given bass line (figured or unfigured), projecting affect, and creating dynamics at the harpsichord. Emphasizes individual cognition and creativity. Recommended prereqs., MUSC 2325 and PMUS 1586. Same as MUSC 5405.

**MUSC 5215 (1-2). Studies in Piano Teaching.** Studies the practical aspects and techniques for teaching piano at the intermediate and advanced levels in pre-college and college settings, as well as teaching group piano at the college level. May be repeated up to 2 total credit hours. Recommended prereqs., MUSC 5305 and 5315. Restricted to graduate piano majors.

**MUSC 5305-2. Piano Pedagogy Group Techniques.** Discusses materials and techniques for teaching beginning piano students of various ages in studio and class settings. Special attention given to adult classes. Includes an introduction to educational technology used in group instruction. Offered fall of odd-numbered years.

**MUSC 5315-2. Piano Pedagogy: Intermediate Literature.** Surveys repertoire at the intermediate level and discusses teaching techniques. Explores issues related to intermediate and advanced piano performance, such as performance anxiety, physical and psychological well-being of the performer, and the development of technique. Introduces educational technology relevant to intermediate teaching. Offered spring of even-numbered years.

**MUSC 5325-2. Keyboard Literature 1.** Examines areas of style, genre, and performance practice in selected keyboard music from 1600 to 1830. Emphasizes student presentation of specific topic areas. Offered fall semester of even-numbered years.

**MUSC 5335-2. Keyboard Literature 2.** Examines areas of style, genre, and performance practice in selected areas of keyboard music from 1830 to the present. Emphasizes student presentation of specific topic areas. Offered spring semester of odd-numbered years.

**MUSC 5345-2. Research: Piano Literature and Pedagogy.** Looks at individual or group research related to piano pedagogy or literature for piano. May be repeated up to 12 total credit hours.

**MUSC 5365-2. Advanced Accompanying.** May be repeated up to 12 credit hours. Same as MUSC 4365.

**MUSC 5375-2. Opera Coaching for Pianists.** Teaches skills for opera coaches and rehearsal pianists. May be repeated up to 12 total credit hours.

**MUSC 5405-2. Basso-Continuo Accompaniment.** Same as MUSC 4405.

**MUSC 5425-2. Collaborative Literature for Piano with Winds, Brass, and Percussion.** Study of all forms of wind, brass and percussion repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Focus will be on standard literature and reading and listening assignments will be supplemented by in-class performances and presentations. Prereq., instructor consent. Offered fall only.

**MUSC 5435-2. Collaborative Literature for Piano with Strings.** Study of all forms string repertoire involving collaboration with piano including sonatas, duos, short pieces and concerti. Focus will be on standard literature and reading and listening assignments will be supplemented by in-class performances and presentations. Prereq., instructor consent. Offered spring only.

**MUSC 6325-2. Seminar in Piano Literature.** Provides an intensive study of a selected area of repertoire or history. May be repeated up to 6 total credit hours. Restricted to doctoral students or instructor consent required. Offered fall only.

## Keyboard Musicianship

**PMUS 1105-1. Keyboard Musicianship 1.** Introduces the keyboard, music reading in the treble and bass clefs, basic theory and keyboard harmony, technical patterns, and improvisation. Studies easy classical and pop repertoire. May be repeated up to 12 total credit hours. Restricted to music majors with no keyboard experience or instructor consent required.

**PMUS 1205-1. Keyboard Musicianship 2.** Continuation of PMUS 1105. Prereq., PMUS 1105 or instructor consent.

**PMUS 1515-2. Jazz Piano Class.** Offers small group instruction in the concepts and skills required to learn jazz piano. Students not only learn basic techniques required to play jazz but also become familiar with the theory, grammar, and lexicon of the jazz language. May be repeated up to 4 total credit hours. Prereq., PMUS 1205 or instructor consent required. Offered spring only.

**PMUS 2105-1. Keyboard Musicianship 3.** Continuation of PMUS 1205. May be repeated up to 12 total credit hours. Prereq., PMUS 1205 or instructor consent required.

**PMUS 2205-1. Keyboard Musicianship 4.** Continuation of PMUS 2105. Prereq., PMUS 2105 or instructor consent.

**PMUS 4105-1. Supervised Accompanying.** Assigned projects, both vocal and instrumental, are coached by collaborative piano faculty and others. May involve recital, jury, or masterclass performances. Prereq., MUSC 1325 and MUSC 2365 or instructor consent.

## Choral and Instrumental Music

**MUSC 1326-1. Guitar Musicianship.** Activities in sight-reading, fretboard harmony and comprehension of harmony and texture. Some work will be tied to the repertoire being studied in studio lessons. Open only to students with an emphasis on guitar performance in their degree plan.

**MUSC 2366-2. Guitar Accompanying.** Survey of accompanying repertoire for guitar with solo instruments (flute, violin, voice, etc.), including introductory work in basso continuo, playing/improvising from chord charts, and arranging accompaniments from musical scores. Prereq., MUSC 1326.

**MUSC 3176-2. Conducting 1.** Introduces conducting and rehearsal techniques. Coreq., performance participation in the appropriate ensemble (band, choir, or orchestra). Offered fall only.

**MUSC 3186-2. Conducting 2.** Introduces conducting and rehearsal techniques. Coreq., performance participation in the appropriate ensemble (band, choir, or orchestra). Prereq., MUSC 3176. Restricted to music education majors. Offered spring only.

**PMUS 3271-2. Basic Improvisation.** The exploration of basic musical improvisation; performance in various musical styles. Prereq., MUSC 2111 or instructor consent. Offered spring of even-numbered years.

**MUSC 4106-2. Guitar Literature.** An analytical and historical survey of the repertory of the guitar and its antecedents from the Renaissance to the present day.

**PMUS 4517-2. Orchestral Repertoire.** Focuses on the art of orchestral excerpt preparation.

**MUSC 5026-2. Percussion Literature.** In-depth investigation of major original solo works for percussion, significant ensemble literature including chamber and large ensembles, and selected transcriptions. Prereqs., graduate standing in music and instructor consent.

**MUSC 5036-2. Brass Literature.** Investigates major original solo works for trumpet, horn, trombone, euphonium, and tuba, and ensemble literature including chamber and large settings. Offered every other spring semester.

**MUSC 5106-2. Guitar Literature.** For graduate students. Same as MUSC 4106.

**MUSC 5136-2. Advanced Conducting.** Offers advanced work in conducting. May be repeated up to 12 total credit hours.

**MUSC 5156-2. Symposium in Choral Music.** Provides an advanced study of choral repertoire by style period. Required of all choral graduate students for a minimum of two semesters.

**MUSC 5246-3. Jazz Improvisation and Analysis.** A study of improvisation through melodic and harmonic analysis of jazz compositions, transcriptions, and the study of historic jazz solos as played by jazz masters. Recommended prereq., MUSC 3071. Offered fall only.

**MUSC 5256-3. Jazz Studies Administration and Pedagogy.** Studies the organization and administration of collegiate jazz programs. Topics include curriculum, program philosophy, teaching techniques, funding, teacher training, and evaluation. Recommended prereq., MUSC 3253. Offered fall only.

**MUSC 5336-2. Brass Pedagogy.** Analyzes pedagogical techniques and philosophies of teaching brass instruments, and examines materials. Offered every other spring semester.

**MUSC 5346-3. Woodwind Pedagogy.** Provides the knowledge and skills to teach woodwind instruments in both private studio and collegiate class settings. Considers pedagogical techniques addressing all levels of instruction.

**MUSC 5356-2. Jazz Studies Practicum.** Studies strategies for developing and implementing academic programs in jazz studies. Includes demonstration teaching by class members. Recommended prereq., MUSC 5256.

**MUSC 5666-2. Chamber Music Literature: Woodwinds.** Provides a stylistic-historical survey in various genres from Baroque era to present. May be repeated up to 12 total credit hours. Offered every other spring.

**MUSC 7046-3. Seminar in Jazz Literature.** Provides advanced study in jazz literature and styles. Students present results of research on individually chosen topics or aspects of a topic central to the class. Requires class presentations and a major paper or project. May be repeated up to 6 total credit hours. Recommended prereqs., MUSC 5091 and 5642. Restricted to doctoral students. Offered every other year.

## Theses and Recitals

**MUSC 2997-0. Sophomore Proficiency.** To be completed by the second semester of the sophomore year.

**MUSC 3997-1. Junior Recital.**

**MUSC 4957 (1-4). Senior Thesis.**

**MUSC 4997-1. Senior Recital.**

## Interdepartmental Courses

**MUSC 2608-1. Alexander Technique.** Investigates the discoveries and writings of F. M. Alexander regarding kinesthetic perception and coordination. Applies these contexts to specific musical activities.

**MUSC 2988-1. Introduction to Music Research.** Introduces music research and writing skills to provide tools necessary for successful composition of formal research papers. Applies interests and curricular goals to specific topics of student choice. May be repeated up to 12 total credit hours.

**MUSC 3608-1. Advanced Studies in the Alexander Technique.** Continue of MUSC 2608 with greater concentration on utilizing Alexander principles in specialized activity. Prereq., MUSC 2608 or instructor consent.

**MUSC 4078-1. Piano Technician for Pianists.** Familiarizes pianists with the development of the modern grand piano, its construction, and the proper terminology of parts and specifications. Trains pianists in minor repairs and adjustments of the grand piano action, and in minor tuning tasks. Recommended restriction, piano majors. Same as MUSC 5078.

**MUSC 4288 (2-3). Macintosh-based Web Server Fundamentals for Musicians and Educators.** Designed for music students. Teaches concepts and skills necessary to develop, host, and maintain Macintosh-based web servers and to create and serve multimedia files including video, MP3, MIDI, and PDF.

**MUSC 5078-1. Piano Technician for Pianists.** Same as MUSC 4078.

**MUSC 5608-1. Graduate Studies in the Alexander Technique.** Study of the relationship of kinesthetic perception and postural reflexes to physical coordination in performance. Analysis and research regarding Alexander's principles.

**MUSC 5708-2. Introduction to Music Bibliography and Research.** Explores basic informational sources about music and musicians; a study of bibliographic forms, research, and writing techniques employed in music research papers, theses, and dissertations. Required in all master's degree programs.

**MUSC 7138-3. Contemporary Issues in College Teaching.** Examines music teaching within colleges and universities, including the evolution of university music programs, undergraduate and graduate music curricula, music professors and their work, and sociopolitical issues. Offered spring of odd-numbered years.

## Music Entrepreneurship

**MUSC 4908 (1-3). Internship in Music Business.** Gives upper-division students the opportunity to work with public or private organizations on assignments relating to their career goals, allowing them to explore the relationship between theory and practice in their major. May be repeated up to 6 total credit hours. Prereq., instructor consent.

**MUSC 4918-2. Your Music Career.** Equips students to develop, evaluate, and achieve their career goals. Areas of study include marketing, basic business management, use of technology and the internet, and defining one's role as an artist citizen. Restricted to juniors and seniors.

**MUSC 4958-1. Community Performances.** Designed for the aspiring professional performer. Through classroom theory and off-campus application, acquire skills in programming for and communicating with diverse audiences, self marketing, finding engagements, executing performance contracts, and maintaining an active performing career. Will result in an actual musical presentation in the community.

**MUSC 5968-2. Arts Entrepreneurship.** Prepares students to evaluate opportunities in their specific arts fields by analyzing existing arts organizations and then applying entrepreneurial concepts to create new enterprises. Topics for research and discussion include current issues in the arts, introduction to entrepreneurship, preparing a business feasibility study, market information for new ventures, and funding sources.

## Thesis Music

**TMUS 4403-4493 (1-3). Special Studies.** Offers advanced studies in specific areas or special projects in selected areas. For undergraduate majors only. See current online Schedule Planner for specific course number. May be repeated for additional credit.

**TMUS 4493 (1-3). Special Studies.** Offers advanced studies in specific areas or special projects in selected areas. For undergraduate majors only. See current online Schedule Planner for specific course number. Numbered TMUS 4403–4493. May be repeated for additional credit.

**TMUS 5504-5594 (1-3). Special Studies.** Offers graduate studies in specific areas or special projects in selected areas. For master's degree students only. See current online Schedule Planner for specific course number. May be repeated for additional credit.

**TMUS 5605-5695. (1-3). Special Studies.** Offers advanced graduate studies in specific areas or special projects in selected areas. For doctoral degree students only. See current online Schedule Planner for specific course number. May be repeated for additional credit.

**TMUS 6947-3. Candidate for Master of Music.**

**TMUS 6956-2. Master's Thesis.**

**TMUS 6957-2. Master's Thesis 2.**

**TMUS 8019-1. Precandidate for Doctor of Musical Arts.**

**TMUS 8029-1. Candidate for Doctor of Musical Arts.**

**TMUS 8119 (1-4). Composition Project 1.** Students compose works in a variety of genres, totaling at least 30 minutes of music. Students meet weekly with a composition teacher to discuss and develop their works. Restricted to DMA composition students.

**TMUS 8129 (1-4). Composition Project 2.** Students compose works in a variety of genres, totaling at least 30 minutes of music. Students meet weekly with a composition teacher to discuss and develop their works. Prereq., TMUS 8119. Restricted to DMA composition students.

**TMUS 8219-3. Dissertation Project 1 (Solo Recital, Choral Concert, Composition).**

**TMUS 8229-3. Dissertation Project 2 (Solo Recital, Choral Concert, Composition, Vocal Pedagogy Project).**

**TMUS 8239-3. Dissertation Project 3 (Chamber Music Recital, Vocal Pedagogy Project, Choral Project, Composition Recital).**

**TMUS 8249-3. Dissertation Project 4 (Chamber Music Recital, Choral Project, Composition Recital, Wind/Percussion Practicum).**

**TMUS 8259-3. Dissertation Project 5 (Research Lecture).**

**TMUS 8269-3. Dissertation Project 6 (Research Lecture).**

**TMUS 8279 (1-3). Performance Research Document 1.**

**TMUS 8289-1. Performance Research Document 2.**

**TMUS 8299-1. Performance Research Document 3.**

**TMUS 8309-1. Performance Research Document 4.**

**TMUS 8319-3. Repertoire Project.**

**TMUS 8329 (2-6). Document/Pedagogy Project.**

**TMUS 8339 (3-6). Major Composition.**

**TMUS 8998 (1-10). PhD Thesis.**

## Other Academic Programs

### Alliance for Technology, Learning, and Society

**ATLS 1220-4. Virtual Worlds: An Introduction to Computer Science.** Introduces the fundamental principles of computer science using an on-line virtual world called Second Life as the “laboratory” for the course. Students will learn how to program by creating objects of interest in Second Life. In-class and in-world discussions and readings will introduce the student to important ideas and concepts that shape the field of computer science. Same as CSCI 1220.

**ATLS 1240-3. The Computational World.** Introduces and explores the “computational style of thinking” and its influence in science, mathematics, engineering and the arts. The course does not focus on the nuts and bolts of any particular programming language, but rather on the way in which computing has affected human culture and thought in the past half century. Same as CSCI 1240.

**ATLS 1710-3. Introduction to Games Development 1.** Designed for students with little or no programming background. Students learn to program with a tool such as ActionScript 3.0 using object-oriented techniques and classes offered by the programming language class hierarchy. Programs developed in the course address mathematical problems relating to such topics as carrying capacity, competition, and population cycle, among others. Coreq., APPM 1350. Same as APPM 1710.

**ATLS 1720-3. Introduction to Games Development 2.** Continuation of APPM 1710, this course addresses students with knowledge of a programming language such as ActionScript 3.0. Students learn to plan, develop and test Flash applications (games, simulations, and animations) that embody mathematical formulations of problems in areas such as transportation, nutrition, and alternative energy. Prereq., ATLS 1710. Coreq., APPM 1360. Same as APPM 1720.

**ATLS 2000-3. The Meaning of Information Technology.** Surveys the history of information technologies and modern techniques of information production, storage, transmission, and retrieval. Equips students with an understanding of technological transformations in interpersonal, organizational, and mass communication. Emphasis is on the technological, social and political changes that underlie the movement toward a digital society. Restricted to TAM/MAT certificate students.

**ATLS 2010-3. Computer Code as Art.** Instructs non-computer science students in analyzing problems and synthesizing programs for the solution, emphasizing good engineering practices for program construction, documentation, testing, and debugging. Uses Java for programming projects. Recommended prereq., ATLS 2000. Restricted to TAM/MAT certificate students.

**ATLS 3010-3. Digital Media 1.** Introduces techniques, software, and related concepts of digital design and image making through individual and group projects. Emphasizes digital animation, digital audio, digital video and website design and development as a means to formal and expressive ends. Introduces students to critical readings and theories related to digital media practice. May be repeated up to 6 total credit hours. Prereq., ATLS 2000. Restricted to TAM certificate students.

**ATLS 3020-3. Digital Media 2.** A continuation of Digital Media 1 (ATLS 3010), this course introduces students to advanced digital media development including interactive programming, scripting, and database functionality. Emphasizes a historical and conceptual understanding of programming and computational theories. Prereq., ATLS 2000. Recommended prereq., ATLS 3010. Restricted to TAM certificate students.

**ATLS 3110-3. Motion Design.** An animation-based projects course that advances student understanding of motion design in today’s culture. Through active production and critical analysis, students will create new media projects and critically examine the history, social implications, and impacts of these forms of mass media. Prereq., ATLS 2000.

**ATLS 3112 (1-3). Digital and Social Systems Professional Development.** Supports students in developing professional skills and practices in human computer interaction, design of interactive systems, computer supported cooperative work, computer supported collaborative learning, educational technology, tools that support creativity, user-developed knowledge collections, and gaming. May be repeated up to 10 total credit hours. Same as CSCI 3112.

**ATLS 3120-3. Net Presence.** An Internet-based projects course that advances student understanding of Internet culture. Through active production and critical analysis, students will explore their individual roles in the digital landscape and critically examine the social implications and impacts of digital communities. Prereqs., ATLS 2000 and 3010. Recommended prereq., ATLS 3020.

**ATLS 3500 (1-3). Client Projects in Technology, Arts and Media.** Allows undergraduate students to work on collaborative projects with faculty and with external organizations under faculty supervision. The course will focus on teamwork, conceptual planning, technical design and development, and working within real-world client environments. Critical skills include project research, planning, design, development, trouble-shooting, and presentation. Prereqs., ATLS 2000, 3010, or instructor consent. Recommended prereq., ATLS 3020. May be repeated up to 6 total credit hours.

**ATLS 3519 (1-3). Special Topics in Technology, Arts, and Media.** Analyzes special interest areas of multidisciplinary technology, arts and media research and practice. May be repeated up to 12 total credit hours for different topics. Prereq., ATLS 2000. Recommended prereq., ATLS 3010.

**ATLS 4010-3. Capstone Projects.** Offers advanced practicum for students to design, implement, document, and test multimedia systems for use in local industry, and non-profit organizations. Design of project management parameters and close work with project sponsors lead to acquisition of practical experience. May be repeated up to 6 total credit hours. Prereqs., ATLS 2000 and 3010. Restricted to TAM/MAT certificate students.

**ATLS 4519 (1-3). Advanced Special Topics in Technology, Arts, and Media.** Analyzes special interest areas of multidisciplinary technology, arts and media research and practice. May be repeated up to 9 total credit hours. Prereq., instructor consent. Recommended prereqs., ATLS 2000, ATLS 3010, and ATLS 3020. Same as ATLS 5519.

**ATLS 4900 (1-6). Undergraduate Independent Study.** Provides opportunities for independent study at the upper-division undergraduate level. Students work on research or a creative project guided by faculty. May be repeated up to 9 total credit hours. Prereqs., ATLS 3010, 3020, and consent of instructor.

**ATLS 5519 (1-3). Advanced Special Topics in Technology, Arts, and Media.** Same as ATLS 4519.

**ATLS 5900 (1-6). Masters Level Independent Study.** Provides opportunities for independent study and research at the Masters level. Students work on research project guided by faculty. May be repeated up to 6 total credit hours. Prereq., instructor consent. Restricted to ATLS graduate students in good academic standing.

**ATLS 7000-1. ATLAS Seminar.** This student/faculty seminar critically examines issues in Technology, Media and Society from the multiple interdisciplinary perspective of the gathered participants. Topics may include: IT and business, security, ethics, globalization, digital divide, IT and education, human computer interaction and others. May be repeated up to 8 total credit hours. Instructor permission required.

**ATLS 7800-2. Online Course Design for the Foreign Languages.** Learn about the challenges and affordances of designing online foreign languages courses. Read research articles and book chapters pertaining to instructional design issues and online teaching strategies. Experiment with the latest forms of educational technologies. Students enrolled in the course will design and teach a two-week online language course. Prereq., two years of language teaching experience at the college level.

**ATLS 7900 (1-6). Doctoral Level Independent Study.** Provides opportunities for independent study and research at the Doctoral level. Students perform independent research under faculty supervision. May be repeated up to 6 total credit hours. Prereq., instructor consent. Restricted to ATLS PhD students in good academic standing.

**ATLS 8990 (1-10). Doctoral Dissertation.** Approved research conducted under the supervision of members of the graduate faculty. Investigates some specialized topic or field in the area of interdisciplinary information and communication technology. All doctoral students must register for at least 30 hours of dissertation credit as part of the requirement for the ATLAS doctoral degree. Prereq., instructor consent. Restricted to ATLS PhD students in good academic standing.

## Leadership Residential Academic Program at Williams Village

**LDSP 1000-3. The Foundations of 21st Century Leadership.** Introduces students to the critical need for and approaches to the practice of creative and effective leadership. Premised on the idea that the potential for leadership is present in all of us. Approved for arts and sciences core curriculum: ideals and values.

**LDSP 1561-1. Compassionate Leadership and Mindfulness.** Explores various practices and traditions that lead to a balanced, physical, mental, emotional, and spiritual life critical to the practice of effective leadership. Prereqs., LDSP 1000 and 2400. May be repeated up to 3 total credit hours.

**LDSP 1571-1. Topics in Leadership.** Examines the complex nature of leadership by applying knowledge and practice to contemporary and social issues. May be repeated up to 3 total credit hours. Prereq., LDSP 1000 and 2400.

**LDSP 2400-3. Understanding Privilege and Oppression in Contemporary Society-Leadership in a Multicultural World.** Broad-based, multicultural, multidisciplinary course. Covers the interaction of privilege and oppression in the U.S., focusing on race, socioeconomic class, sexual orientation, and physical ability, as well as leadership skills needed to function in a multicultural, global society. Same as FARR 2400. Approved for arts and sciences core curriculum: human diversity.

**LDSP 2910 (1-3). Field Practicum 1.** Offers supervised campus and off-campus experiences tied to course work in the Chancellor's Leadership RAP or the INVST program. See also LDSP 2920. May be repeated up to 6 total credit hours. Same as EDUC 2910.

**LDSP 2920 (1-3). Field Practicum 2.** Offers supervised campus and off-campus experiences tied to course work in the Chancellor's Leadership RAP or the INVST program. See also LDSP 2910. May be repeated up to 6 total credit hours. Same as EDUC 2920.

**LDSP 3100 (3-4). Multicultural Leadership: Theories, Principles and Practices.** Focuses on leadership theories and skills necessary for effectiveness in multicultural settings. Students gain understanding of traditional and culturally diverse approaches to leadership and change through comparative analyses of western and non-western theories and practices. Community service required. Same as ETHN 3201 and INVS 3100. Approved for arts and sciences core curriculum: human diversity.

**LDSP 4010-4. Critical Issues in Leadership: A Capstone Course.** Critical thinking is fundamental to leadership competency. Leaders must have skill at making judgments and collecting information from a variety of sources and on topics in which they have limited expertise. Students read, discuss, and write critical evaluations of contemporary leadership theory from an ethical, military, community building, and business perspective. Prereq., a minimum of 10 credit hours towards the Leadership Certificate completed. Approved for arts and sciences core curriculum: critical thinking.

## Career Services

**CSVC 1000-1. Work Internship.** A one credit pass/fail course, opened to students in good academic standing, whose internship employers require that they receive course credit. The student must first seek to obtain academic credit through their major department. Will not count toward degree requirements in any UCB school or college. No appeals for credit toward degrees or for letter grades in the course will be entertained.

## Norlin Scholars Program

**NRLN 2000-3. Ways of Knowing: Constructions of Knowledge in the Academy and Beyond.** Explores different ways of knowing from interdisciplinary, cross-cultural perspectives. Course begins with personal interrogations of students' primary learning modes. It goes on to examine cultural assumptions about schooling, learning and knowledge, juxtaposing western and eastern philosophies of knowing and looking at how gender, race, class, and other categories of identity shape and interpret concepts of knowledge. Same as ARSC 2000. Approved for arts and sciences core curriculum: ideals and values.

**NRLN 3000 (1-3). Norlin Scholars Special Topics.** Provides students a small, interdisciplinary seminar experience focusing on critical reading and writing, discussion, and experiential and practical learning. Students will apply their disciplinary knowledge and personal experiences to course content. May be repeated up to 6 total credit hours provided the topics are different. Restricted to Norlin Scholars.

**NRLN 3020-3. Topics in Writing: Norlin Scholars.** Focuses on reading, analysis, and writing about major ideas and events. Emphasizes close, careful reading, thoughtful analysis, and student writing. Provides a high-level academic course that enhances reading, writing, and thinking skills. May be repeated up to 6 total credit hours. Same as WRTG 3020. Approved for arts and sciences core curriculum: written communication.

## President's Leadership Class

**PRLC 1810-3. Ethical Leadership.** Introduces fundamental principles of leadership and ethics. Emphasizes application of the principles for self-development and organizational effectiveness. Approved for arts and sciences core curriculum: ideals and values.

**PRLC 1820-3. Community Issues in Leadership.** Explores challenges to leadership at the community level such as drug abuse, poverty, decline of infrastructure, care of the aged, etc. Gives particular attention to the development of effective leadership responses to community difficulties at university, city, state, and national levels. Approved for arts and sciences core curriculum: contemporary societies.

**PRLC 2810-3. Global Issues in Leadership.** Examines the challenges of leadership posed by change and major global issues affecting everyone. Explores issues such as human rights, hunger, disease, large-scale collective violence, and environmental deterioration with a special emphasis on effective, long-term leadership strategies.

**PRLC 2820-3. Multilevel Issues in Leadership.** Studies multilevel issues that originate in organizational settings but carry community and global implications. Encourages students to fully explore the complexity and interrelatedness of issues with a special emphasis on leadership and ethical implications.

**PRLC 2930-3. Leadership Internship.** Students analyze the leadership styles within a host organization, examine how successfully an organization fulfills its mission, and further refine their own theories of what constitutes effective leadership. Students also complete a meaningful project over the course of the internship. Prereqs., PRLC 1810, PRLC 1820, and PRLC 2820.

**PRLC 3810-3. Global Issues in Leadership.** Examines the challenges to leadership posed by major global issues. Problems in the areas of human rights, hunger, disease, large-scale collective violence, and environmental deterioration are explored with a special emphasis on the development of effective, long-term leadership strategies. Prereqs., PRLC 1810, PRLC 1820, and PRLC 2820.

**PRLC 4010-4. 21st Century Leadership.** An advanced course that focuses on critical analysis of leadership principles and techniques. Designed to provide theoretical and hands-on experience for individuals who wish to function in leadership roles at high levels of competence in the workplace and in the civic arena.

## Reserve Officer Training Corps (ROTC)

### Air Force Aerospace Studies

**AIRR 1010-1. Foundations of the United States Air Force 1.** One 1-hour lecture and one 2-hour lab per week. Introduces students to the U.S. Air Force and the USAF officer profession. Uses instructor lectures, films and videos, and group activities to examine Air Force issues, officership qualities, and military customs and courtesies. Emphasizes the communication skills necessary for an Air Force officer.

**AIRR 1020-1. Foundations of the United States Air Force 2.** A continuation of AIRR 1010-1. One 1-hour lecture and one 2-hour lab per week.

**AIRR 2010-1. The Evolution of USAF Air and Space Power 1.** One 1-hour lecture and one 2-hour lab per week. Studies air power from balloons and di-

rigibles through the jet age and historically reviews air power employment in military and nonmilitary operations in support of national objectives. Looks at the evolution of air power concepts and doctrine and introduces the development of communicative skills.

**AIRR 2020-1. The Evolution of USAF Air and Space Power 2.** A continuation of AIRR 2010. One 1-hour lecture and one 2-hour lab per week.

**AIRR 3010-3. Air Force Leadership Studies I.** Two 1 1/2-hour seminars plus one 2-hour lab per week. Provides an integrated management course emphasizing concepts and skills required by the successful manager and leader. Includes individual motivational and behavioral processes, leadership, communication, and group dynamics while providing foundation for the development of the junior officer's professional skills (officership). Emphasizes decision making and use of analytic aids in planning, organizing and controlling in a changing environment. Discusses organizational and personal values (ethics), management of change, organizational power, politics, managerial strategy, and tactics within the context of military organization. Uses actual Air Force case studies throughout the course to enhance the learning and communication process.

**AIRR 3020-3. Air Force Leadership Studies II.** Two 1 1/2-hour seminars and one 2-hour lab per week. Continuation of AIRR 3010. Emphasizes basic managerial processes while employing group discussions, case studies, and role playing as learning devices. Continues to emphasize the development of communicative skills.

**AIRR 4010-3. National Security Affairs/Preparation for Active Duty.** Two 1 1/2-hour seminars and one 2-hour lab per week. Studies U.S. national security policy which examines the formulation, organization, and implementation of national security policy; context of national security; evolution of strategy; management of conflict; and civil-military interaction. Also includes blocks of instruction on the military profession/officership, the military justice system, and communicative skills. Provides future Air Force officers with the background of U.S. national security policy so they can effectively function in today's Air Force.

**AIRR 4020-3. National Security Forces in Contemporary American Society 2.** Two 1 1/2-hour seminars and one 2-hour lab per week. A continuation of AIRR 4010. Includes defense strategy conflict management, formulation/implementation of U.S. defense policy, and organizational factors and case studies in policy making, military law, uniform code of military justice, and communication skills.

## Military Science (U.S. Army)

**MILR 1011-2. Adventures in Leadership 1.** Introduces fundamentals of leadership and the United States Army. Examines its organization, customs, and history as well as its current relevance and purpose. Students also investigate basic leadership and management skills necessary to be successful in both military and civilian settings. Includes fundamentals of Army leadership doctrine, team-building concepts, time and stress management, an introduction to cartography and land navigation, marksmanship, briefing techniques, and some basic military tactics.

**MILR 1021-2. Adventures in Leadership 2.** Continues the investigation of leadership in small organizations. Covers selected topics such as basic troop leading procedures, military first aid and casualty evacuation concepts, creating ethical work climates, an introduction to Army organizations and installations, and a further examination of basic military tactics. Introduces students to effective military writing styles.

**MILR 2031-3. Methods of Leadership and Management 1.** Comprehensively reviews advanced leadership and management concepts including motivation, attitudes, communication skills, problem solving, human needs and behavior, and leadership self development. Students continue to refine effective written and oral communications skills and to explore topics such as the basic branches of the Army, and officer and NCO duties. Students conduct classroom and practical exercises in small unit light infantry tactics and are prepared to perform as midlevel leaders in the cadet organization.

**MILR 2041-3. Methods of Leadership and Management 2.** Focuses on leadership and management functions in military and corporate environments. Studies various components of Army leadership doctrine to include the four elements of leadership, leadership principles, risk management and planning theory, the be-know-do framework, and the Army leadership evaluation program. Continue to refine communication skills.

**MILR 3052-3. Military Operations and Training 1.** Further explores the theory of managing and leading small military units with an emphasis on practical applications at the squad and platoon levels. Students examine various leadership styles and techniques as they relate to advanced small unit tactics. Familiarizes students with a variety of topics such as cartography, land navigation, field craft, and weapons systems. Involves multiple, evaluated leadership opportunities in field settings and hands-on experience with actual military equipment. Students are given maximum leadership opportunities in weekly labs.

**MILR 3062-3. Military Operations and Training 2.** Studies theoretical and practical applications of small unit leadership principles. Focuses on managing personnel and resources, the military decision making process, the operations order, and oral communications. Exposes the student to tactical unit leadership in a variety of environments with a focus on preparation for the summer advance camp experience. Prereq., consent of the Professor of Military Science.

**MILR 4072-3. Officer Leadership and Development 1.** Examines management and leadership concepts and techniques associated with planning and executing military training and operations at company and higher echelons. Includes analyses of professional ethics and values, effective training principles and procedures, subordinate counseling, and effective staff officer briefing techniques. Also investigates other subjects such as counter terrorism, modern peacekeeping missions, and the impact of the information revolution on the art of land warfare. Conducted both in and out of classroom setting and with multiple practical leadership opportunities to organize cadet training and activities. Prereq., consent of the Professor of Military Science.

**MILR 4082-3. Officer Leadership and Development 2.** Continues MILR 4072 study of management and leadership concepts and techniques, providing practical leadership experiences in the classroom and during multiple cadet-run activities. Also examines varied topics such as theory and practice of the military justice system, law of war, military-media relations, support mechanisms for soldiers and their families, operational security considerations, and historical case studies in military leadership in the context of 21st century land warfare. Prereq., consent of the Professor of Military Science.

## Naval Science

**NAVR 1010-2. Introduction to Naval Science.** Introduces the structure, missions, and functions of the United States Navy and Marine Corps. Also covers military law, leadership, naval history, and concepts of sea power.

**NAVR 2020-3. Seapower and Maritime Affairs.** Studies the importance of seapower in history including naval, maritime, and other commercial uses of the sea. Emphasizes significant milestones in the history of the U.S. Navy and Marine Corps and their role in the national strategies and policies of the United States.

**NAVR 3020-3. Naval Operations and Seamanship.** Examines the Inland and International Rules of the Nautical Road, including court interpretations, principles of relative motion and vector analysis with the maneuvering board, ship handling procedures, weather, communications, tactical operations, and maritime law.

**NAVR 3030-3. Naval Engineering Systems.** Studies in detail ship propulsion and related auxiliary systems. Emphasizes fossil fuel and nuclear steam and gas turbine systems. Stresses design constraints imposed by unique marine environment.

**NAVR 3040-3. Weapons and Systems Analysis.** Introduces theoretical concepts upon which modern naval weapons systems are designed and constructed. Specific areas of study include physics of underwater sound propagation, pulse radar theory, automatic tracking principles, and fundamentals of missile guidance.



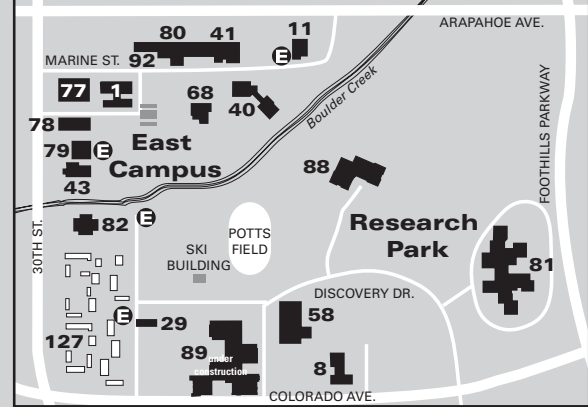
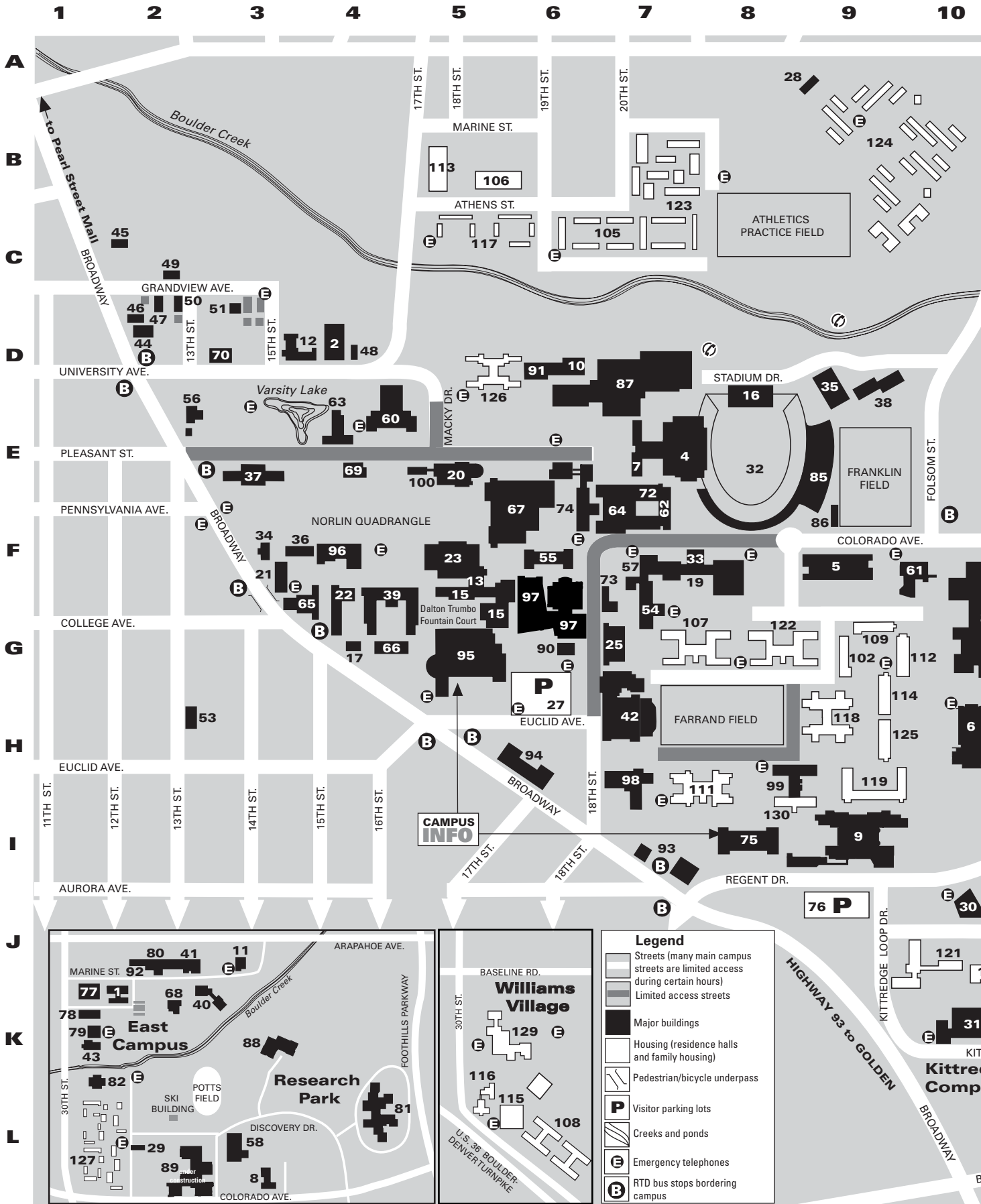
**NAVR 3101-3. Evolution of Warfare.** Traces the development of warfare, focusing on the impact of military theorists and technical developments. Assists students to acquire a sense of strategy, develop an understanding of military alternatives, and see the impact of historical precedent on military actions.

**NAVR 4010-3. Leadership and Management 1.** Comprehensively studies organizational leadership. Emphasizes motivation, communication, empowerment, and needs of subordinates. Studies the role of professional and personal ethics in organizational leadership.

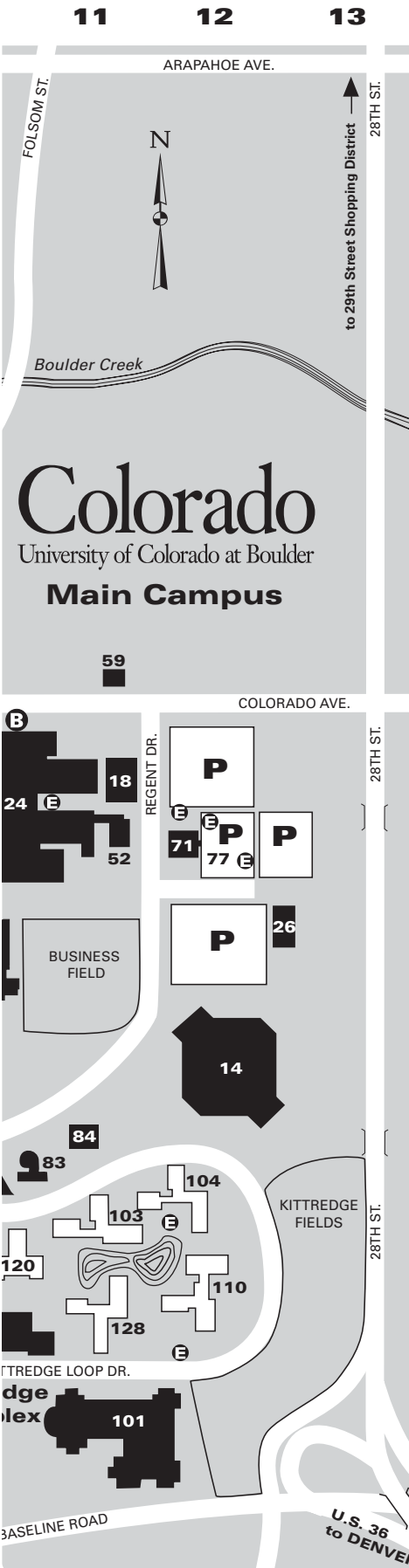
**NAVR 4020-3. Leadership and Ethics.** Studies the ethics and laws of armed conflict, analyzing the leadership responsibilities of officers in conflict. Studies the military justice system and Naval legal administrative procedures, comparing military law with civilian criminal and civil law. Defines the responsibilities of junior officers within the military justice system.

**NAVR 4030-3. Navigation.** Offers theory and practical application in the art of navigation: charts, publications, piloting, dead reckoning, navigation aids and instruments, time, sextant use, electronic fixing, global positioning system, and voyage planning.

**NAVR 4101-3. Amphibious Warfare.** Surveys the development of amphibious doctrine. Emphasizes the evolution of amphibious warfare in the 20th century. Explores present-day potential and limitations on amphibious operations, including the rapid force deployment concept.



- Legend**
- Streets (many main campus streets are limited access during certain hours)
  - Limited access streets
  - Major buildings
  - Housing (residence halls and family housing)
  - Pedestrian/bicycle underpass
  - Potts Field
  - Ski Building
  - Discovery Dr.
  - Colorado Ave.
  - Aurora Ave.
  - Euclid Ave.
  - College Ave.
  - Pennsylvania Ave.
  - Pleasant St.
  - University Ave.
  - Grandview Ave.
  - Stadium Dr.
  - Mackay Dr.
  - Folsom St.
  - Regent Dr.
  - Baseline Rd.
  - Arapahoe Ave.
  - Foothills Parkway
  - Kittredge Loop Dr.
  - Broadway
  - Highway 93 to Golden
  - U.S. 26 Boulder-Denver Turnpike
  - Visitor parking lots
  - Emergency telephones
  - RTD bus stops bordering campus

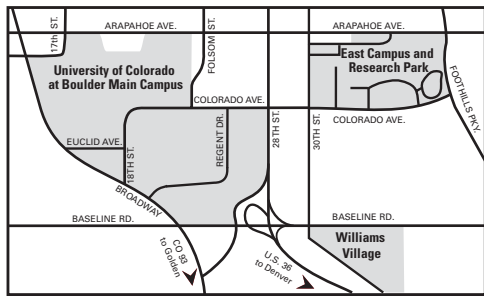


**University Buildings**

1. Administrative and Research Center—East Campus (J-2) (ARCE)
2. Armory (D-4) (ARMR)
3. ATLAS Building (Alliance for Technology, Learning, and Society) (G-6) (ATLS)
4. Balch Fieldhouse (E-7) (FH)
5. Benson Earth Sciences (F-9) (BESC)  
\* Bruce Curtis Building. *See Museum Collections.*
6. Business, Leeds School of (H-10). *See Koelbel Building.*
7. Carlson Gymnasium (E-7) (CARL)
8. Center for Astrophysics and Space Astronomy (L-3) (CASA)
9. Center for Community (I-9) (C4C) *under construction*
10. Clare Small Arts and Sciences (D-6) (CLRE)  
\* Charlotte York Irey Studios (F-4). *See University Theatre.*
11. Computing Center (J-3) (COMP)
12. Continuing Education and Professional Studies (D-4) (CEDU)
13. Cooperative Institute for Research in Environmental Sciences (F-5) (CIRES)
14. Coors Events/Conference Center (I-12) (EVENT)
15. Cristol Chemistry and Biochemistry (G-5) (CHEM)
16. Dal Ward Athletic Center (D-8) (DALW)
17. Denison Arts and Sciences (G-4) (DEN)
18. Discovery Learning Center (F-11) (DLC)  
\* Drescher Undergraduate Engineering. (G-11) *See Integrated Teaching and Learning Laboratory.*
- \* Duane Physical Laboratories (F-7). *See Duane Physics and Astrophysics, Gamow Tower, Laboratory for Atmospheric and Space Physics, and JILA.*
19. Duane Physics and Astrophysics (F-7) (DUAN)
20. Eaton Humanities Building (E-5) (HUMN)
21. Economics (F-3) (ECON)
22. Education (G-4) (EDUC)
23. Ekeley Sciences (F-5) (EKLC)
24. Engineering Center (F/G-10/11) (EC)
25. Environmental Design (G-7) (ENVD)
26. Environmental Health and Safety Center (H-13) (EHSC)
27. Euclid Avenue AutoPark (G-6) (EPRK)
28. Family Housing Children's Center—Main Offices (A-9) (DACR)
29. Family Housing Children's Center at Smiley Court (L-2)
30. Fiske Planetarium and Science Center (J-10) (FISK)
31. Fleming Building (K-10) (FLMG)
32. Folsom Stadium (E-8) (STAD)
33. Gamow Tower (F-7) (DUAN)
34. Gates Woodruff Women's Studies Cottage (F-3) (COTT)
35. Grounds and Service Center (D-9) (GRNS)
36. Guggenheim Geography (F-3) (GUGG)
37. Hale Science (E-3) (HALE)
38. Health Physics Laboratory (D-9) (HPHY)
39. Hellems Arts and Sciences/Mary Rippon Theatre (G-4) (HLMS)  
\* Henderson Building (G-4). *See Museum of Natural History.*
40. Housing System Maintenance Center (K-3) (HSMC)
41. Housing System Service Center (J-2) (HSSC)
42. Imig Music (H-7) (MUS)
43. Institute for Behavioral Genetics (K-1) (IBG)
44. Institute of Behavioral Science No. 1 (D-2) (IBS1)
45. IBS No. 2 (C-2) (IBS2)
46. IBS No. 3 (D-2) (IBS3)
47. IBS No. 4 (D-2) (IBS4)
48. IBS No. 5 (D-4) (IBS5)
49. IBS No. 6 (C-2) (IBS6)
50. IBS No. 7 (C-2) (IBS7)
51. IBS No. 8 (C-3) (IBS8)
52. Integrated Teaching and Learning Laboratory (G-11) (ITLL)
53. International English Center (G-2) (IEC)
54. JILA (G-7)
55. Ketchum Arts and Sciences (F-6) (KTCH)  
\* Koelbel Building (H-10) (KOBL). *See Leeds School of Business.*
56. Koenig Alumni Center (E-2) (ALUM)
57. Laboratory for Atmospheric and Space Physics (F-7) (LASP)
58. LASP Space Technology Research Center (L-3) (LSTR)
59. Lesser House (F-11) (LESS)  
\* Life Sciences Laboratories Complex (E-7). *See Muenzinger Psychology, Porter Biosciences, and Ramaley Biology.*
60. Macky Auditorium (D-4) (MCKY)
61. Mathematics Building (F-10) (MATH)
62. MCD Biology (E-7) (MCDB)
63. McKenna Languages (E-4) (MKNA)
64. Muenzinger Psychology (E-7) (MUEN)
65. Museum Collections (Bruce Curtis Building) (G-3) (MCOL)
66. Museum of Natural History, University of Colorado (G-4) (HEND)
67. Norlin Library (E-6) (LIBR)
68. Nuclear Physics Laboratory (K-2) (NPL)
69. Old Main (E-4) (MAIN)
70. Page Foundation Center (D-3) (PFDC)
71. Police and Parking Services (G-12) (PDPS)
72. Porter Biosciences (E-7) (PORT)
73. Power House (F-6) (POWR)
74. Ramaley Biology (E-6) (RAMY)
75. Regent Administrative Center (I-8) (RGNT)
76. Regent Drive AutoPark (G-12) (RPRK)
77. Research Laboratory, Litman RL1 (J-1) (LITR)
78. Research Laboratory (K-1) (RL2)
79. Research Laboratory, Life Science RL4 (K-1) (LSRL)
80. Research Laboratory, RL6 (Marine Street Science Center) (J-2) (MSSC)
81. Research Park (L-4) (USW)
82. Research Park Greenhouse (K-1) (GH-3)
83. Sommers-Bausch Observatory (I-11) (OBSV)
84. Speech, Language, and Hearing Sciences (I-11) (SLHS)
85. Stadium Building (E-8) (STAD)
86. Stadium Ticket Building (F-9) (STTB)
87. Student Recreation Center (D-6/7) (REC)
88. Sybase (K-3) (SYBS)
89. Systems Biotechnology (L-2) (BIOT) *under construction*
90. Telecommunications Building (G-6) (TCOM)
91. Temporary Building No.1 (D-6) (TB01)
92. Transportation Center (J-2) (TRAN)
93. University Administrative Center and Annex (I-7) (UCTR)
94. University Club (H-6) (CLUB)
95. University Memorial Center (G-5) (UMC)
96. University Theatre (including Charlotte York Irey Studios) (F-4) (THTR)
97. Visual Arts Complex (G-6) (VAC)
98. Wardenburg Health Center (H-7) (WARD)
99. Willard Administrative Center (H-8) (WCTR)
100. Woodbury Arts and Sciences (E-5) (WDBY)
101. Wolf Law Building (L-12) (WLF)

**University Housing**

102. Aden Hall—Quadrangle (G-9) (ADEN)
103. Andrews Hall—Kittredge Complex (J-11) (ANDS)
104. Arnett Hall—Kittredge Complex (J-12) (ARNT)
105. Athens Court (B/C-6/7) (ATCT)
106. Athens North Hall (B-6) (ATHN)
107. Baker Hall (G-7) (BKER)
108. Bear Creek Apartments—Williams Village (L-6) (W-BC)
109. Brackett Hall—Quadrangle (G-9) (BRKT)
110. Buckingham Hall—Kittredge Complex (K-12) (BUCK)
111. Cheyenne Arapaho Hall (H-7) (CHEY)
112. Cockerell Hall—Quadrangle (G-10) (CKRL)
113. College Inn Hall (B-5) (CICC)
114. Crosman Hall—Quadrangle (G-10) (CROS)
115. Darley Commons—Williams Village (L-6) (DLYC)
116. Darley Towers—Williams Village (K-5) (DLYT)
117. Faculty Staff Court (C-5/6) (FACT)
118. Farrand Hall (H-9) (FRND)
119. Hallett Hall (H-9) (HLET)
120. Kittredge Commons—Kittredge Complex (J-10) (KITT)  
\* Kittredge Complex. *See Kittredge Commons, Andrews, Arnett, Buckingham, Kittredge West, and Smith Halls.*
121. Kittredge West Hall—Kittredge Complex (J-10) (KITW)
122. Libby Hall (G-8) (LIBY)
123. Marine Court (B-7) (MRCT)
124. Newton Court (B/C-9/10) (NTCT)  
\* Quadrangle (Engineering Quadrangle). *See Aden, Brackett, Cockerell, and Crosman Halls.*
125. Reed Hall (H-10) (REED)
126. Sewall Hall (D-5) (SWLL)
127. Smiley Court (L-1) (SMCT)
128. Smith Hall—Kittredge Complex (K-11) (SMTH)
129. Stearns Towers—Williams Village (K-6) (STRN)
130. Willard Hall—South Wing (H-8) (WLRD)  
\* Williams Village. *See Bear Creek Apartments, Darley Towers, and Stearns Towers.*



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SUSAN M. MOORE, director of clinical education and services; clinical professor. BA, College of New Rochelle; MA, JD, University of Denver.

LYNEA PEARSON, instructor. BA, MA, University of Colorado at Boulder.

LORRAINE OLSON RAMIG, professor. BS, University of Wisconsin–Oshkosh; MS, University of Wisconsin–Madison; PhD, Purdue University.

PETER R. RAMIG, professor. BS, MS, University of Wisconsin; PhD, Purdue University.

BARBARA RENDE, instructor. BS, Seton Hall University; MS, University of Arizona; PhD, University of Colorado at Boulder.

NEERAJA SADAGOPAN, assistant professor. BSc, All India Institute of Speech and Hearing; MS, PhD, Purdue University.

BRENDA SCHICK, professor. BS, Purdue University; MS, Washington University; PhD, Purdue University.

SCOTT SCHWARTZ, adjunct instructor. BA, State University of New York at New Paltz; MA, Ohio University, Athens; PhD, University of Wisconsin–Madison.

ANU SHARMA, professor. BSc, University of Bombay; MA, PhD, Northwestern University.

LYNN SNYDER, professor emerita.

RICHARD H. SWEETMAN, professor emeritus.

AMY THRASHER, instructor. BA, Williams College; MA, University of Colorado at Boulder.

ROBERT TRAYNOR, adjunct instructor. BA, MA, EdD, University of Northern Colorado.

KRISTIN UHLER, adjunct lecturer. BA, University of Northern Colorado; MA, PhD, University of Colorado at Boulder.

RITA S. WEISS, professor emerita.

ANNE WHITNEY, clinical professor. BS, MS, Colorado State University; EdD, University of Northern Colorado.

CHRISTINE YOSHINAGA-ITANO, professor. BA, University of Southern California; MA., PhD, Northwestern University.

## Theatre and Dance

BUD COLEMAN, department chair; associate professor. BFA, Texas Christian University; MFA, University of Utah; PhD, University of Texas at Austin.

BRUCE BERGNER, associate chair; associate professor. BA, University of Minnesota; MFA, University of Illinois.

MARTIN T. COBIN, professor emeritus.

KERRY M. CRIPE, senior instructor. BFA, University of Evansville; MFA, Florida State University.

RICHARD DEVIN, professor emeritus.

NADA DIACHENKO, professor. BS, University of Maryland; MA, New York University.

MICHELLE ELLSWORTH, assistant professor. BA, New York University; MFA, University of Colorado at Boulder.

OLIVER GERLAND, associate professor. BA, Swarthmore College; PhD, Stanford University.

ROBIN HAIG, senior instructor emerita.

TOBY R. HANKIN, director of dance; associate chair; professor. BA, Barnard College; MA, Mills College.

MARKAS HENRY, assistant professor. BS, Ball State University; MFA, University of Connecticut.

CHARLOTTE YORK IREY, professor emerita.

MERRILL J. LESSLEY, professor. BFA, University of Utah; MA, University of Minnesota; PhD, University of Utah.

JESSE MANNO, instructor, BA, University of Colorado.

GABRIEL MASSON, assistant professor. BFA, University of Southern Mississippi; MFA, NYU/Tisch School of the Arts.

STEVE McDONALD, senior instructor. BA, University of Colorado at Boulder; MFA, University of California, Irvine.

TAMARA MENEGHINI, assistant professor. BA, St. Mary's College; MFA, Northern Illinois University.

LYNN NICHOLS, general manager of Colorado Shakespeare Festival; senior instructor. BA, University of the South; MA, Emporia State College; PhD, University of Colorado at Boulder.

BETH OSNES, assistant professor. BA, Marquette University; MA, PhD, University of Colorado at Boulder.

ONYE OZUZU, associate professor. BA, MFA, Florida State University.

CECILIA J. PANG, associate professor. BA, University of Guelph, Ontario, Canada; MA, San Francisco State University; PhD, University of California, Berkeley.

CHIP PERSONS, assistant professor. BFA, University of California, Santa Barbara; MFA, Columbia University.

MARGARET LEE POTTS, associate professor emerita.

ERIKA RANDALL, assistant professor. BA, University of Washington at Seattle; MFA, Ohio State University.

ROBERT J. SHANNON, senior instructor.

NII ARMAH SOWAH, instructor. BA, University of Ghana; MA, Lesley College.

NANCY L. SPANIER, professor emerita.

THEODORE STARK, senior instructor. BA, College of William and Mary; MFA, Boston University.

JAMES M. SYMONS, professor. BA, Illinois College; MA, Southern Illinois University; PhD, Cornell University.

LETITIA S. WILLIAMS, senior instructor emerita.

DANIEL YANG, professor emeritus.

## Western American Studies

PATRICIA NELSON LIMERICK, faculty director, Center of the American West; professor of history. BA, University of California, Santa Cruz; MA, MPhil, PhD, Yale University.

## Women and Gender Studies

ANNE N. COSTAIN, director; professor. AB, Brown University; MA, PhD, Johns Hopkins University.

LORRAINE BAYARD de VOLO, associate professor. BA, University of California, Santa Barbara; PhD, University of Michigan.

ROBERT BUFFINGTON, associate professor. BA, Colorado College; PhD, University of Arizona.

ALISON M. JAGGAR, professor. BA, University of London; MLitt, University of Edinburgh; PhD, State University of New York at Buffalo.

DEEPTI MISRI, assistant professor. BA, University of Mumbai; MA, PhD, University of Illinois, Urbana.

CELESTE MONTOYA, assistant professor. BS, Bradley University; MA, PhD, Washington University, St. Louis.

ANNE MARIE POIS, senior instructor emerita.

MARCIA C. WESKOTT, professor emerita.

## Writing and Rhetoric, Program for

JOHN ACKERMAN, director; associate professor. BA, MA, University of Missouri; PhD, Carnegie Mellon University.

STEVEN LAMOS, associate director; assistant professor. BA, MA, PhD, University of Illinois.

PATRICIA MALESH, associate director; assistant professor. BA, MA, Salisbury State University; PhD, University of Arizona.

MICHELLE ALBERT, instructor. BA, Towson State University; MFA, Naropa University; MA, University of Colorado Denver.

ANNE BLISS, senior instructor. BA, Seattle University; MA, PhD, University of Colorado at Boulder.

DANIEL BRIGHAM, instructor. BA, Arizona State University; MM, University of Colorado at Boulder.

ERIC BURGER, instructor. BA, Colby College; MFA, University of Arizona; PhD, University of Utah.

SIGMAN BYRD, instructor. BA, Sarah Lawrence College; MFA, University of Iowa, Iowa Writer's Workshop; PhD, University of Utah.

FRANCES CHARTERIS, senior instructor. BFA, School of Visual Arts, New York; MFA, University of California, San Diego.

AMBER DAHLIN, instructor. BA, MA, University of Wyoming; PhD, University of New Hampshire.

DIANE DEBELLA, instructor. BA, James Madison University; MA, California State, San Diego.

REBECCA J. DICKSON, senior instructor. BA, Colorado State University; MA., PhD, University of Colorado at Boulder.

CHARLES DOERSCH, instructor. BA, University of Nebraska; MFA, Columbia University.

DAMIAN DOYLE, senior instructor. BA, Central Connecticut State University; MA, University College Dublin; PhD, University of Colorado at Boulder.

JAY ELLIS, senior instructor. BA, Berklee College of Music; MA, University of Texas; PhD, New York University.

DON ERON, senior instructor. BA, University of Colorado at Boulder; MFA, University of Iowa.

ANDREA FELDMAN, senior instructor. BA, Cornell University; MA, PhD, University of Colorado at Boulder.

TRACY FERRELL, instructor. BA, College of William and Mary; MA, PhD, University of Colorado at Boulder.

H. LYNN GINGRASS, senior instructor. BA, New York University; MA, Temple University.

AMY GOODLOE, instructor. BA, Agnes Scott College; MEd, University of Virginia; MA, Virginia Polytechnic Institute and State University.

SALLY GREEN, instructor. BA, University of Illinois, Urbana-Champaign; MA, University of Colorado at Boulder.

JOAN LORD HALL, senior instructor. BA, University College, London; MLitt, Girton College, Cambridge.

MICHÉL HENDRY, instructor. BS, Grand Valley State University; MS, Colorado State University.

ORLY HERSH, instructor. BA, Mount Holyoke College; MA, Northern Arizona University.

NANCY HIGHTOWER, instructor. BA, Ft. Lewis College; MA, PhD, University of Denver.

VERONICA HOUSE, instructor. BA, Wellesley College; MFA, University of Maryland at College Park; PhD, University of Texas at Austin.

SUZANNE HUDSON, instructor. BA, MA, University of Colorado at Boulder.

ELIZA KLINGER, instructor. BA, Richard Stockton College of New Jersey; MA, New Mexico State University.

ERIC KLINGER, instructor. BA, MA, New Mexico State University.

GINGER KNOWLTON, senior instructor. BA, Kenyon College; MA, University of Colorado at Boulder; PhD, University of Denver.

PETER KRATZKE, instructor. BA, MA, University of Washington; PhD, University of Kentucky.

CATHERINE KUNCE, senior instructor. BA, Colorado College; MA, PhD, University of Denver.

CATHERINE LASSWELL, instructor. BA, Michigan State University, MEd, University of Vermont.

JUDITH LAVINSKY, senior instructor. BA, MA, University of Chicago.

MOLLY LECLAIR, instructor. BA, MA, University of Colorado.

TIM LYONS, instructor. BA, Occidental College; MA, Johns Hopkins University.

ANNA MACBRIAR, instructor. BA, Humboldt State University; MA, PhD, University of Southern Mississippi.

CHRISTINE MACDONALD, senior instructor. BA, Pomona College; MA, PhD, University of Colorado at Boulder.

NANCY D. MANN, senior instructor. BA, Eckerd College; MA, PhD, Stanford University.

SUSAN McARTHUR, instructor. BA, San Jose State University; MA, University of Colorado at Boulder.

ROBERT McBREARTY, instructor. BA, Instituto Allende/University of Guanajuato; MFA, University of Iowa.

LYNDA McNEIL, instructor. BA, Syracuse University; MA, Pennsylvania State University; PhD, University of Maryland.

PAUL T. MURPHY, senior instructor. BA, Boston College; MA, McGill University, Montreal; PhD, University of Colorado at Boulder; MSt, Merton College, University of Oxford.

ROLF NORGAARD, senior instructor. BA, Wesleyan University; MA, PhD, Stanford University.

NONA OLIVIA, instructor. BA, University of Santa Cruz; AM, PhD, Brown University.

LONNI PEARCE, instructor. BA, William Jewell College; MA, University of Missouri, Kansas City; PhD, University of Arizona.

KATHRYN PIEPLOW, instructor. BA, Augustana College; JD, University of South Dakota.

JOHN PIIRTO, senior instructor. BS, MS, University of Wisconsin; MFA, University of California.

ESTHER QUINLAN, instructor. BA, Simmons College; MA, University of Colorado at Boulder.

KERRY REILLY, instructor. BA, Providence College; MA, University of New Hampshire; PhD, University of Iowa.

TONY RUIZ, instructor. BA, California State University, Sacramento; MA, University of Washington, Seattle.

PETGER SCHABERG, senior instructor. BA, DePaul University; MA, University of Colorado at Boulder.

ERIKA SCHRECK, instructor. BA, University of Wisconsin–Green Bay, MA, University of Wisconsin–Milwaukee.

PATRICIA SULLIVAN, professor. BA, MA, University of Utah; PhD, Ohio State University.

TORY TUTTLE, instructor. BA, University of Colorado; MEd, University of Hartford; MA, University of Colorado at Boulder.

TOBIN VON DER NUPELL, instructor. BA, San Diego State University; MA, University of Colorado at Boulder.

JAMES WALKER, instructor. BA, University of California, Riverside; MA, PhD, University of Colorado at Boulder.

PAULA WENGER, senior instructor. BA, University of Northern Colorado; MA, University of Denver; MA, Miami University.

DONALD H. WILKERSON, senior instructor. BA, MA, University of Colorado at Boulder.

MATTHEW O. WILSEY-CLEVELAND, instructor. BA, BA Hons, PhD, University of New South Wales, Sydney.

STEVEN WINGATE, instructor. BA, University of Massachusetts; MFA, Florida State University.

ROSALYN ZIGMOND, instructor. BA, University of Michigan; MA, PhD, University of Colorado Denver. dsjk;fglldsk;ffdsf

cies within campus housing, contact Residence Life, **303-492-7260**. For information regarding the Student Conduct Code, contact the Office of Judicial Affairs, **303-492-5550**. For information on alcohol and drug enforcement, including municipal and state laws, call the University Police, **303.492.8168**.

### Colorado Creed

The Colorado Creed, developed by students in 2003, is a code of conduct, a lifestyle, by which students at CU-Boulder live. The text of the Creed is:

As a member of the Boulder community and the University of Colorado, I agree to:

- Act with honor, integrity, and accountability in my interactions with students, faculty, staff, and neighbors.
- Respect the rights of others and accept our differences.
- Contribute to the greater good of this community.

I will strive to uphold these principles in all aspects of my collegiate experience and beyond.

For further information, go to [coloradocreed.org](http://coloradocreed.org) or call **303-492-8476**.

### Copyright and File Sharing

Unauthorized distribution of copyrighted materials, regardless of the medium, is illegal. In order to deter unauthorized use, the university utilizes technological solutions to curb this activity. Still, the university regularly receives notices of copyright violations and is required by law to take action. Initial action taken by the university includes a three-strike rule, which includes a mandatory educational component as well as the possibility of suspension of network privileges. The copyright website ([ucblibraries.colorado.edu/copyright](http://ucblibraries.colorado.edu/copyright)) provides additional resources about the legitimate use of copyrighted materials in academic and other work. Be informed and understand copyright and fair use guidelines and apply them appropriately!

### Discrimination and Harassment, Office of

The University of Colorado at Boulder is committed to fostering a collegial academic community whose mission requires a positive learning, working, and living environment. As a place of work and study, CU-Boulder should be free of sexual harassment as well as discrimination and harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status and related retaliation. Discrimination, harassment, and related retaliation are prohibited on campus and in university programs. The university is committed to taking appropriate action against those who violate the university's policies prohibiting discrimination and harassment.

No retaliation of any kind shall be taken against an individual for complaining about or participating in any procedure to redress a complaint of discrimination or harassment. It is a violation of the policies if an individual intentionally alleges false complaints of discrimination, harassment, or retaliation or provides false information during the course of an investigation.

For information or copies of the University of Colorado Policy on Sexual Harassment, the University of Colorado Policy on Conflict of Interest in Cases of Amorous Relationships, or the University of Colorado at Boulder Policy on Discrimination and Harassment, please call **303-492-2127** or visit the Office of Discrimination and Harassment website at [www.colorado.edu/odh](http://www.colorado.edu/odh).

### Final Examination Policy

It is the policy of the University of Colorado at Boulder to adhere to the final examination schedule as published in the online at the registrar's website ([registrar.colorado.edu](http://registrar.colorado.edu)) each semester. While it may be appropriate not to give a final in some cases, such as laboratory courses, seminars, and colloquia, final examinations are integral parts of the instructional program and should be given in all other undergraduate courses. Unless notified otherwise in writing during the first week of classes, students should assume that an examination will be given.

In addition to the principles stated above, the following guidelines should be followed by all faculty members and administrators in order to assure fairness and the best possible educational experience for students.

1. The final examination in a course must be given as scheduled and not at other times, even if the faculty member and all students in a course agree to such a change.
2. The week of classes preceding the scheduled final examination period should be used primarily for continued instruction and may include the introduction of new material. No hourly examinations are to be given during the seven days preceding the start of the final examination period. However, lab practicums and seminar presentations may be scheduled during this week.
3. Individual students may be granted a variance from these policies, provided the instructor is satisfied that the exception is based on good and sufficient reasons, and that such an exception for an early or late examination will not prejudice the interests of other students in the course.
4. When students have three or more final examinations on the same day, they are entitled to arrange an alternative examination time for the last exam scheduled on that day. Such arrangements must be made no later than the end of the sixth week of the semester. Students are expected to provide evidence that they have three or more examinations to qualify for exceptions.
5. This policy applies to all undergraduate students, including seniors. Graduating seniors are not exempted from final examinations. Such exemptions are inappropriate on both procedural and academic grounds.

### Personal Safety on Campus

While the University of Colorado at Boulder is a relatively safe place to be, the campus is not a haven from community problems. Through the joint effort of various organizations on campus, CU is committed to providing ample safety resources for faculty, staff, and students.

Specific efforts to promote safety on campus include the provision of adequate lighting, police protection, educational programs, and special prevention programs, such as the CU Night Ride escort services and laptop and bicycle registration programs. Emergency telephones are located on campus to provide direct access to the police dispatcher. See the university's parking and traffic map in the Parking Services Office or *Ralphie's Guide to Student Life* for exact locations of these phones.

In compliance with the Federal Crime Awareness and Campus Security Act of 1990 and the Higher Education Amendments of 1992, 1998, and 2000, students and employees receive (at the start of the fall semester) information on campus security policies and programs, including crime rate information. In any emergency or life-threatening situation, always call **9-1-1**.

Members of the university community are encouraged to report any incident of threatening or harmful behavior to the administrator closest to the situation and/or the University Police at **303-492-6666**. Other resources include the Office of Judicial Affairs at **303-492-5550**, the Ombuds Office at **303-492-5077**, and the CU-Boulder Alcohol and Other Drugs Program at **303-492-5703**.

Additional safety information can be found at [www.colorado.edu/police](http://www.colorado.edu/police) and [www.colorado.edu/safety](http://www.colorado.edu/safety).

## Smoking Policies

Campuswide smoking regulations are not intended to deny smokers their prerogatives, but rather to limit the potential adverse effects of smoking on others.

The Boulder campus smoking policy states:

- There will be no smoking or sale of tobacco products in any Boulder campus-owned or leased building, except as provided below. This includes hallways, classrooms, offices, restrooms, meeting rooms, lobbies, elevators, shops, cafeterias, snack bars, waiting rooms, indoor or open-air athletics facilities, and performance halls. There also will be no smoking in campus-owned or leased vehicles.
- Smoking may be permitted in accordance with the policies of Boulder Campus Housing Administration in buildings providing overnight accommodations. Boulder Campus Housing Administration will provide information regarding its policies to all housing residents and guests.
- Smoking is not permitted in the seating areas of Folsom Stadium and the Mary Rippon Theatre and their contiguous buildings. Designated smoking zones have been created in well-ventilated areas outside the seating areas.
- Smoking and the sale of tobacco products may be permitted in designated food service areas and lounges in accordance with the policies of that facility. Designated smoking areas must be well posted and have adequate ventilation and separation for nonsmokers. Designated smoking areas must be reviewed and approved by the Department of Environmental Health and Safety (EH&S). Any disputes regarding the recommendations of EH&S will be referred to the vice chancellor for administration for resolution.
- Smoking may be permitted in laboratories conducting sponsored research on the effects of smoking. Designated laboratories must be well posted and have adequate ventilation and separation for nonsmokers. These labs must be reviewed and approved by EH&S. Any disputes regarding the recommendations of EH&S will be referred to the vice chancellor for administration for resolution.
- Smoking areas are permitted outside of university facilities provided that these areas are located far enough away from doorways, windows, and ventilation systems to prevent smoke from entering enclosed buildings and facilities. Check with EH&S for details.
- Signs posted at all building entrances shall state that smoking is prohibited in the building.
- Smokers and nonsmokers need to remain courteous to each other. Since smokers cannot smoke while working, they may want to take “smoke breaks.” As long as their absences fall within applicable work-break policies, accommodations should be made by supervisors and colleagues. Smokers are reminded that a wish to smoke is not a sufficient reason to be gone in excess of the standard work-break.

- All members of the university community are responsible for compliance with this policy. Violations of this policy by university employees will be referred first to the violator then, if agreement cannot be reached, the violation should be reported to the appropriate appointing or supervisory authority for resolution.

Those employees who wish to stop smoking may call the Employee Assistance Program (**303-492-6766**) for information on available programs. For more information on the campus smoking policy, contact the office of the vice chancellor for administration.

## Student E-mail Policy

All CU students receive an e-mail account from the university, which is an official means of sending information to students. Students are responsible for maintaining this CU e-mail address. The official e-mail address can be used by professors to contact students and provide course-related information. Administrative offices, such as the Office of the Registrar, use official e-mail addresses to contact students and provide important information. Students are responsible for frequently checking their official CU e-mail address. Using CUConnect ([cuconnect.colorado.edu](http://cuconnect.colorado.edu)), students can activate their e-mail accounts, change their passwords, and redirect their mail. For more information on the student e-mail policy, visit [www.colorado.edu/its/email/index.html](http://www.colorado.edu/its/email/index.html) or call the IT Service Center at **303-735-HELP** or e-mail them at [HELP@colorado.edu](mailto:HELP@colorado.edu).

## Student Conduct Policies and Procedures

### *Student Conduct Code*

The purpose of the Student Conduct Code is to maintain the general welfare of the university community. The university strives to make the campus community a place of study, work, and residence where people are treated, and treat one another, with respect and courtesy. The university views the student conduct process as a learning experience that can result in growth and personal understanding of one’s responsibilities and privileges within both the university community and the greater community. All students must follow these standards. Students who violate these standards will be subject to the actions described below. These procedures are designed to provide fairness to all who are involved in the conduct process.

### *Authority*

Article 7, Part B, of the Laws of the Regents requires each campus to develop a student code of conduct. The Office of Judicial Affairs is authorized to establish and administer this policy.

Any questions regarding interpretation of this code or any of its provisions should be directed to the vice chancellor for student affairs or his/her designee for final determination. Questions regarding behavioral problems should be directed to the Office of Judicial Affairs, University of Colorado at Boulder, 10 UCB, Boulder, CO 80309; phone **303-492-5550**.

### *Jurisdiction*

This policy governs:

- Student conduct that occurs on or as it relates to university property, or at official functions and university-sponsored programs conducted away from the campus. University property is defined as land, buildings, and facilities in possession of or owned, used, or controlled by the university or funded by university budgets.



- Student conduct that occurs off university property is subject to this policy if it: (1) adversely affects the health, safety, or security of any member of the university community or the mission of the university; or (2) involves any records or documents of the university. For purposes of this policy, the university's mission is broadly defined to include both its academic goals and the importance of developing civic responsibility in its students.

All students residing in Housing & Dining Services facilities are subject to the applicable Housing & Dining Services procedures, except:

- Cases in which the potential sanction is suspension or expulsion.
- Cases which are referred to Judicial Affairs by Housing & Dining Services.

Proceedings initiated under this policy are separate from civil or criminal proceedings that may relate to the same incident. Investigations or conduct proceedings by the university are not postponed while criminal or civil proceedings are pending, unless otherwise determined by the conduct officer.

The unexcused failure of a student to appear and/or respond to the conduct process does not prevent the university from proceeding with the conduct process.

### *The Office of Judicial Affairs*

The mission of the Office of Judicial Affairs is to establish an ethic of care at the University of Colorado at Boulder, through its preventive, behavioral, and accountability practices. Establishment of an ethic of care will assist in providing a safe, respectful, and supportive community where students, parents, faculty, and staff will be challenged to develop their critical thinking, values, connectedness to the community, sense of identity, understanding of independence and interdependence, and multicultural awareness.

An “ethic of care” model is a holistic approach to engage community members regarding their behaviors and responsibilities, recognizing that concern for self and others in a community of individuals can have a powerful impact. The Office of Judicial Affairs supports this holistic model in an effort to aid in student development and contribute to a positive, successful and respectful, living and learning environment throughout the university community.

The values of the Office of Judicial Affairs are:

- Civic responsibility and student involvement
- Education and development of all students
- Respect, dignity and equity
- A socially just community
- Responsibility, accountability and critical thinking
- Fairness, honesty, and integrity

### *Duties and Expectations of Students*

It is the duty of all students involved in the conduct process to participate conscientiously. Students have a duty to discuss the incident with an investigator and a conduct officer over the telephone or in person, adhere to stated deadlines, attend scheduled meetings, and participate in all proceedings. Failure to meet these duties may result in a decision being made without the benefit of the student's participation or may result in a student being charged with failing to comply with the directions of a university official. It is the responsibility of a charged student to seek modification of any criminal or civil restraining orders to allow for the completion of any conduct process defined in the Student Conduct Code.

The Office of Judicial Affairs views the conduct process as a learning experience that helps students to understand their responsibility to both themselves and their living and learning community. Individuals strive to learn from one another in an educational community that holds both mutual respect for individuals and community and self-responsibility for behaviors in high regard. Behavior that conflicts with established standards, policies, and guidelines of the University of Colorado will be referred for campus conduct proceedings.

Every member of the living and learning community must assume responsibility for becoming educated about the various university standards, policies, and guidelines. Each individual community member who works, lives, studies, teaches, does research, conducts business, or is involved in the living and learning community is a part of that community by choice. By making that choice, each community member agrees to contribute to an educationally purposeful community. It is against the basic nature of this community for anyone to demean or discriminate against another human being. A caring, educational community does not tolerate physical or psychological threats, harassment, intimidation, or violence directed against a person. Such behavior is subject to the university's conduct processes.

Students must accept responsibility for maintaining an atmosphere conducive to education and scholarship by respecting the personal safety and individual rights of all in the university community, by conducting himself/herself in accordance with accepted standards of social behavior, and by abiding by the regulations of the university and the laws of the city, state, and nation.

### *Appendices*

Students should pay special attention to the appendices of the Student Conduct Policies and Procedures at [www.colorado.edu/studentaffairs/judicialaffairs](http://www.colorado.edu/studentaffairs/judicialaffairs), in which specific definitions and procedures for sexual misconduct, intimate partner violence, and stalking are outlined. Excerpts from the Colorado Revised Statutes regarding hazing, ethnic intimidation, and riots are also presented. Colorado law prohibits persons convicted of rioting from enrolling in state-supported universities/colleges for 12 months following the date of a conviction.