The University of Rochester values diversity and is committed to equal opportunity for all persons regardless of age, color, disability, ethnicity, marital status, national origin, race, religion, sex, sexual orientation, veteran status, or any other status protected by law. Further, the University complies with all applicable nondiscrimination laws in the administration of its policies, programs, and activities. Questions on compliance should be directed to the particular school or department and/or to the University’s Equal Opportunity Coordinator, University of Rochester, P.O. Box 270039, Rochester, New York 14627-0039. Phone: (585) 275-9125.

The information in this bulletin was prepared in the spring of 2007. Provisions of this publication are not to be regarded as an irrevocable contract between the student and the University. The University reserves the right to make changes in its course offerings, degree requirements, regulations and procedures, and fees and expenses as educational and financial considerations require.

Current information is available from the Office of the Registrar, P.O. Box 270038, University of Rochester, Rochester, New York 14627-0038. Phone: (585) 275-5131.
(Separate bulletins also are published for graduate studies and by the Eastman School of Music, School of Medicine and Dentistry, William E. Simon Graduate School of Business Administration, and Margaret Warner Graduate School of Education and Human Development.)
The University of Rochester, founded in 1850, is one of the most innovative of the leading private research universities in the country—and for undergraduates, it’s a university in perfect balance.

Rochester offers the choices and intellectual excitement of a large research university with the intimacy and opportunities for personal involvement of a small liberal arts college.

More than 95 percent of classes are taught by faculty, not teaching assistants, and it’s not uncommon for senior faculty to teach introductory courses—there’s no separation between researching and teaching, between faculty’s own professional excellence and the excellence they bring to the classroom.

Rochester students live on a lively, self-contained campus, just minutes from metropolitan Rochester—a dynamic city that offers a mix of commerce, culture, and history.

Rochester balances its innovative spirit and responsiveness to individual needs with a commitment to the lasting values of a classic liberal arts education.

The results of the Rochester experience are self-evident in the track record of its alumni—in their careers and in their personal lives. “To put it simply,” says one student, “Rochester opens doors.”

For many undergraduates, the Rochester experience means surrounding a chosen major with clusters of related courses that contribute to a broad liberal education. Others choose double majors or earn certificates in complementary fields. Still others individually design their own departmental programs.

And Rochester students can also benefit from the offerings of other schools and departments. For example, undergraduates can enroll in graduate courses; premed students can enroll in classes at the medical school or at the Eastman School of Music; future engineers can diversify their studies with an advanced course in Chaucer.

Rochester’s opportunities are outlined in the remainder of this book. They include:

**The Rochester Curriculum.** Students have the freedom to define their own academic paths, driven by interest and curiosity. At Rochester, we believe that excellence requires freedom.

**The “Take Five” Scholars Program.** Cited as one of the more innovative liberal arts programs in the country, undergraduates may apply for a fifth year of courses tuition free.

**The Senior Scholars Program.** Selected undergraduates devote at least half of their entire senior year to a creative project, whether in the form of scholarly research, a scientific experiment, or a literary or artistic endeavor.

**The Fifth Year in Teaching Program.** A limited number of undergraduates pursue a fifth year of study tuition free in a master’s program at the Margaret Warner Graduate School of Education and Human Development.

**The Rochester Early Medical Scholars (REMS) Program.** Selected Rochester freshmen receive a conditional acceptance to the University of Rochester’s School of Medicine and Dentistry when they finish the bachelor’s degree. The program frees these students to develop their intellects broadly before they launch into their medical studies.

**The Bachelor of Arts Degree in Engineering.** Recognizing the need for broadly educated decision makers who are well versed in engineering, this program gives a student substantial technological knowledge and competence in at least two areas of engineering while also providing the opportunity for a liberal arts education.

**The CareerSource.** A nationwide alliance of more than 1,600 alumni volunteers, parents, and friends advise students on career planning, graduate schools, and internships.

There are approximately 4,600 full-time undergraduates including 480 or so at the Eastman School and 2,400 full-time graduate students at the University. The great majority of classes are small in size, enabling all students to work closely with their teachers. There is a single faculty for all students; some of the most distinguished senior professors teach beginning courses. Reflecting the personal scale of Rochester’s programs, undergraduates are encouraged to work where possible with individual faculty members in the pursuit of original scholarship.

College students must make two major transitions in their first two years. In their first year, they make the important leap from high school to college. As sophomores, they make the crucial choice of a major. The College’s Dean of Freshmen and Dean of Sophomores take special responsibility for those two important years in students’ careers at the University.

An administrative staff also offers support, starting with an orientation program on campus before the beginning of freshman year. Staff are also available to supply advice on course and major requirements; to help students find paying internships and employment opportunities; and to assist in the development of post-college plans.

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The flexible Rochester Curriculum gives students the freedom to explore the disciplines while pursuing their intellectual passions. With their advisors, students identify the courses and programs that they find exciting. Our courses provide students with a deep understanding of the methods of inquiry: developing questions, proposing tentative answers, assessing and rethinking those answers. Our goal is to enable students to learn the way faculty learn so that they can profit fully from the immense intellectual resources of the University while growing as individuals.

—Dean of the College Richard Feldman

School of Education and Human Development to prepare as urban school teachers.

**The Guaranteed Rochester Accelerated Degree in Education (GRADE).** A five-year B.A./B.S + M.S. education program assures students admitted to the University of Rochester who are interested in becoming educators admission to the Margaret Warner Graduate School of Education and Human Development.

**The Kauffman Entrepreneurial Year Program (KEY).** Selected undergraduates devote a tuition-free fifth year to the study or practice of entrepreneurship.
Students can’t expect to gain a “Rochester education” simply by studying and attending class. Out-of-class activities—whether they’re intramural sports, political clubs, community service, or movies and concerts—are a major part of undergraduate life.

THE COLLEGE

The great majority of undergraduates enroll in the College, which comprises departments and programs in arts and sciences and the School of Engineering and Applied Sciences. Therefore, transferring between degree programs does not require any formal “readmission” process. The College’s faculty and staff play an active role in academic advising (page 170).

The College (pages 14 to 135) is the oldest of the University’s seven academic units. The College’s programs in the arts and sciences provide undergraduate and graduate degree programs in the humanities, natural sciences, and social sciences. The College remains the “home” college for most undergraduates during their studies at Rochester.

The College’s School of Engineering and Applied Sciences (pages 136 to 157) enrolls first-year students who express an interest in concentrating in one of the engineering disciplines. Students may also move into an engineering program at any time after their first semester provided they have the appropriate science and mathematics background and have, or can schedule, the necessary prerequisites for their intended major. The School’s Bachelor of Science programs in biomedical, chemical, electrical and computer, and mechanical engineering are accredited by the Accreditation Board for Engineering and Technology, the national accrediting agency of the engineering profession. The Institute of Optics, which also offers a Bachelor of Science degree, is an internationally known center for teaching and research. In addition, there are provisions for student-designed programs that can lead to either a Bachelor of Science in interdisciplinary engineering or a Bachelor of Arts in engineering sciences.

OTHER SCHOOLS OF THE UNIVERSITY

The Eastman School of Music (page 158), known throughout the world as a major center for the education of professional musicians as well as for the study and creation of music, offers diverse curricula leading to undergraduate and graduate degrees. Students pursuing a Bachelor of Arts degree with a major in music through the College take some of their coursework at the Eastman School. Other University undergraduates, having met the requirements and with permission, may also take applied music lessons or other music courses at Eastman. Some students apply and are admitted both to the College and the Eastman School, and pursue a dual degree program.

In addition to the programs leading to the M.M., M.A., and M.F.A. degrees, the School of Music offers unusual opportunities for undergraduates. In the Rochester Early Musical Scholars Program (REMS), exceptionally talented students enter the University with a conditional acceptance to the medical school.

The School of Nursing (pages 159 to 162) offers study leading to the Bachelor of Science degree with a major in nursing. Admission to the School of Nursing requires either a registered nurse license or a prior baccalaureate degree in a non-nursing field. The curriculum is designed to be responsive to adult learners, and this has become the focus of the baccalaureate nursing program. The degree programs offered by the School include a Bachelor of Science, an R.N. to B.S. or R.N. to B.S. to M.S. program for registered nurses, Master of Science nurse practitioner specialties, M.S. in leadership in health care systems, M.S. and Ph.D. dual-degree programs, and the Doctor of Philosophy in Health Practice Research. Post-master’s programs are also available.

The William E. Simon Graduate School of Business Administration (pages 163 to 166) offers graduate study in business administration for management careers in the profit and nonprofit sectors. For undergraduates interested in such careers, it also offers a unique opportunity to earn an undergraduate degree and a Master of Business Administration degree (M.B.A.) in five years instead of the usual six. This 3-2 program consists of three years of undergraduate study in another college followed by two years in the Simon School. The School also offers undergraduate courses in management in the areas of accounting, behavioral science in industry, computers and information systems, finance, general business administration, law, marketing, and operations management. The School cooperates in an undergraduate program leading to a Certificate in Management Studies, offered by the College (see page 80).

The Margaret Warner Graduate School of Education and Human Development (pages 167 to 169) provides a broad range of courses of general interest to educators and those interested in educational issues. The Warner School offers master’s and doctoral degree programs in teaching and curriculum, school leadership, higher education, educational policy, counseling, and human development. Undergraduates can take courses in subjects ranging from the history of American education to child development and learning. Teacher certification is offered through an additional year of graduate study and is offered at the early childhood and elementary level as well as in English, mathematics, Latin, French, Spanish, German, biology, chemistry, physics, earth science, and social studies at the secondary level. The Warner School offers the Guaranteed Rochester Accelerated Degree in Education (GRADE) program, which is a five-year B.A./B.S. + M.S. education program for students admitted to the University of Rochester who are interested in becoming educators. GRADE students enter the University of Rochester with an assurance of admission to the Warner School with the Steven Harrison quarter-tuition scholarship for the duration of the program. The Warner School also offers combined undergraduate and graduate programs in counseling and human development, designed for students planning either to become school counselors or mental health counselors, or to continue with graduate study in human development. Students begin the program in their senior year and complete the master’s degree in one or two years of graduate study.

UNIVERSITY CAMPUSES

The 77-year-old River Campus is the University’s main campus and the residential setting for College undergraduates. It is also the location of the Margaret Warner Graduate School of Education and Human Development.
LIBRARIES

The University library system (see www.rochester.edu/libraries) houses more than three million volumes and has access to about 22,000 periodicals, in print or online. River Campus libraries include Rush Rhees (humanities, social sciences, and business), Carlson Library (sciences and engineering), and the Physics-Optics-Astronomy Library. Beyond River Campus are Edward G. Miner Library (Medical Center), Sibley Music Library (Eastman School of Music), Charlotte Whitney Allen Library (Memorial Art Gallery), and the library at the Laboratory for Laser Energetics.

SPECIAL ACADEMIC OPPORTUNITIES

Students taking their entire four years as undergraduates in the College receive extraordinarily strong grounding in their chosen fields. But the outstanding graduate and professional schools of the University also offer undergraduates many opportunities to study in advanced and specialized areas. With only a few exceptions, students may count credits for courses in any unit of the University toward the bachelor’s degree in the College. Graduate study in one’s specialty may be taken for credit toward the bachelor’s degree by students whose work in a given area is sufficiently advanced.

3-2 PROGRAMS

Five-year combined programs of undergraduate and graduate study (the first three undergraduate, the last two graduate) are available in a number of fields, and permit students to earn a bachelor’s degree (awarded after four years) and a professional master’s degree. This 3-2 option is available in fields including:

- Business administration (page 165)
- Computer science (page 53)
- Engineering and applied sciences (page 138)
- Neuroscience (page 38)
- Physics, physics and astronomy, and medical physics (page 110)
- Public health (page 125)

SENIOR SCHOLARS PROGRAM

The Senior Scholars Program permits selected seniors to devote at least half of the entire final year to a single capstone project that can range from a piece of scholarly research to a work of artistic creativity. Building on the student’s career through the junior year, Senior Scholar projects are marked by intellectual engagement and coherence, and by educational soundness and continuity. The projects may include coursework in addition to independent study. They carry up to 32 hours of academic credit and are composed and carried out under the supervision of faculty advisors. Projects must be completed by the end of the senior year.

“TAKE FIVE” SCHOLARS

The Take Five Scholars Program grants undergraduates a ninth semester or fifth year of study, tuition free, to supplement their regular course requirements. Students may apply any time after they have been accepted into a major through the first semester of their senior year. The program is designed for students who can demonstrate that an additional semester or year of study will broaden and enhance their undergraduate education.

KAUFFMAN ENTREPRENEURIAL YEAR (KEY) PROGRAM

The University of Rochester is one of eight institutions nationwide selected by the Ewing Marion Kauffman Foundation to receive a major, multiyear grant to make entrepreneurship education an integral ingredient of academic activity. This initiative includes the creation of the Kauffman Entrepreneurial Year (KEY) Program that provides students with the opportunity to devote one or two semesters, tuition free, to the study and practice of entrepreneurship.

Qualified students may propose to devote as much as an entire academic year to internships, special projects, business plan development, research into various facets of entrepreneurship, or analysis of how culture and public policy influence entrepreneurial activity. Participation is open to all undergraduates at the University.
UNDERGRADUATE RESEARCH

As a major research institution, the University actively encourages primary research by undergraduates in the natural sciences, engineering, the social sciences, and humanities. Opportunities for doing hands-on, professionally supervised research in fields as diverse as organic chemistry and medieval history are open to qualified students, both within regular courses and in special independent projects during the regular school year and in summer. For information on such opportunities, contact the Director of Undergraduate Research, Office of the Dean, the College.

CERTIFICATE PROGRAMS

Some students combine their departmental majors with an interdisciplinary specialization by following one of the Six Certificate Programs—in actuarial studies, Asian studies, international relations, management studies, mathematical modeling in political science and economics, and Polish and Central European studies—offered through the College Center for Academic Support. The Undergraduate Program in Physics and Astronomy offers a Certificate in Biophysics or Medphysics. In addition, a Certificate in Biotechnology is offered through the Undergraduate Program in Biology and Medicine. These certificates, which give formal recognition to the specialized study, are awarded in addition to the bachelor’s degree. A student wishing to supplement a major in English with a program in business studies, for example, can earn both a Bachelor of Arts degree with a major in English and a Certificate in Management Studies. A Citation for Achievement in College Leadership is also available to students who have developed their leadership skills in the ways outlined by this program.

INDEPENDENT STUDY, INTERNSHIPS, AND STUDY ABROAD

Independent study courses permit qualified students to pursue areas of reading and research not included or not treated in sufficient depth in regularly offered courses. These special tutorial courses are most often on a one-to-one basis with full-time members of the teaching faculty, with the content and objectives of the course determined by faculty-student collaboration.

Practica are credit courses supervised by University faculty members that usually combine field experience with lectures, seminars, and oral and written reports. Each practicum provides direct personal interaction with working professionals in their everyday environment.

Internships enable students to work in a variety of off-campus settings. Students in arts and sciences, working under the supervision of a faculty member, can receive credit for their work. Recent internship placements have included the Rochester District Attorney’s office, the Rochester Democrat and Chronicle, local television stations, environmental field work for the county, the Memorial Art Gallery, George Eastman House, and various financial and investment offices. In social services internships, students have worked in various programs that help emotionally and physically abused children and the developmentally disabled. With special approval, students may engage in full-time internships away from the Rochester area; examples include research projects at the Federal Reserve and at Cohokia Mounds Historical Site. Opportunities for internships in Washington and abroad are described in the sections that follow.

The Washington Semester Program, administered by the Department of Political Science, allows selected students to participate directly in the work of legislators at the national level. Students work full time as staff assistants in the offices of United States senators or representatives for a semester and receive full academic credit. Their activities usually include writing speeches, attending hearings, researching law, taking notes at committee meetings, answering mail, and performing other assignments associated with the political process.

Study Abroad Programs provide qualified students a summer, a semester, or a year of foreign study experience. Currently, more than 70 different Rochester-sponsored opportunities are available in 26 countries. Students are also welcome to take part in programs offered by other American colleges and universities. Options include “on-location” courses taught by Rochester faculty overseas, university exchanges, internships, and traditional study abroad programs. For more information, contact the Center for Study Abroad in 206 Lattimore Hall.

On-location programs are in Israel, Italy, France, Germany, Peru, Russia, Mexico, and England:

Rochester in Arezzo, Italy—a fall-semester program in Italian language, literature, art, and culture. Sponsored by the Department of Modern Languages and Cultures. Open to sophomores, juniors, and seniors.

London Theater Seminar—a “winter term” course offered in London and Stratford in late December to early January. Sponsored by the Department of English.

Peru in Depth—a July course that takes place in four cities, focusing on the history, politics, economics, and religious contexts of Peru. Sponsored by the Department of Religion and Classics.

Month-long summer language courses include Italian in Padua; German in Berlin; French in Rennes (Rochester’s sister city in Brittany); Russian in St. Petersburg; and Spanish in Oaxaca, Mexico. Sponsored by the Department of Modern Languages and Cultures.

Exchange programs permit Rochester students to “trade places” with their counterparts from overseas universities. Current options are in England, Germany, Israel, Japan, and Sweden:

Sussex University, Sussex, England—a one-year exchange for sophomore or junior brain and cognitive sciences majors. Located in Brighton, a half-hour south of London.

University of Cologne, Germany—sponsored by the German section of the Department of Modern Languages and Cultures. A full-year program for juniors or seniors to take courses and to teach English. This unique fellowship program also provides a stipend.

ORT-Braude Technical College, Karmiel, Israel—a spring semester program for sophomore and junior engineering and science majors. Located in the Galilee, in the north of Israel. Sponsored by the School of Engineering and Applied Sciences.

Meiji-Gakuin University, Tokyo, Japan—a semester or yearlong program in Japanese language and culture. Sponsored by the Japanese section of the Department of Modern Languages and Cultures.
Uppsala University, Uppsala, Sweden—a semester or year at one of Europe’s oldest universities, located 45 minutes from Stockholm. English-language courses in the humanities and social and natural sciences.

In addition to these exchanges, universities in Egypt, Israel, and Poland accept visiting Rochester students in special English-language programs. The American University in Cairo, Egypt, offers a semester or a full year at this four-year liberal arts college. AUC is noted for its coursework in Arabic language, Islamic art and architecture, Egyptology, and Middle Eastern history, society, and politics. The overseas program at Ben-Gurion University of the Negev in Beersheva, Israel, offers full-year and semester study. The program begins with an intensive Hebrew-language course (Ulpan), and classes taught in English include such unique options as pre-medical studies, environmental and desert studies, health and social welfare, Israeli studies, and internships. At the Hebrew University of Jerusalem, students attend courses taught in English in history, politics, religion, Judaic studies, economics, and Middle Eastern languages and literatures. Those proficient in Hebrew may enroll in regularly scheduled Hebrew University courses. In Poland, at the Jagiellonian University in Kraków, courses include Polish language, history, Judaic studies, literature, political science, immigration, economics, and sociology. The Jagiellonian University program is sponsored by the University of Rochester’s Skalny Center for Polish and Central European Studies.

Internship programs are located in England, Belgium, France, Germany, and Spain and are open to students majoring in a wide variety of fields. Students take coursework paired with a related internship. Semester programs are offered in all locations, and eight-week summer internships (without coursework) are available in all sites except France and Spain.

London—The British Politics Internship program places students as interns with Members of the House of Commons, pressure groups, party headquarters, or constituency offices, where they carry out research, write speeches and press releases, and experience the workings of the British political system at close hand. Internships in law offices and other private or governmental agencies, and public policy institutes are also offered.

Business internships are available in advertising, banking, finance, marketing, and media. Arts placements include institutions such as theaters, the Victoria and Albert, the Museum of London, galleries, and performing arts centers. Students participate in daily operations, including mounting exhibitions, helping to plan projects, and carrying out research. The Health Science/Medical Research Internship offers students the opportunity to work as interns either in a research laboratory in one of London’s teaching hospitals, in a psychiatric treatment program, or in health care administration in a broad range of facilities.

In Berlin, politics interns work with Members of the Bundestag and political offices. In Bonn, placements are made in business, the arts, museums, and social service agencies. Brussels interns work with Members of the European Parliament. Depending on language proficiency, placements are made with MEPs from any of the 12 European Union member nations. Business placements with multinational corporations are also available. In Madrid, students are placed with Members of the Cortes or other political offices, businesses, and museums. Paris interns can work in politics, the arts, businesses, and theaters.

Rochester belongs to several consortia that provide access to programs through the Institute for the International Education of Students (IES), the Council on International Educational Exchange (CIEE), and Advanced Studies in England (ASE). Through IES, the University of Rochester provides semester and academic year programs in Argentina, Australia, Austria, Chile, China, Ecuador, France, Germany, India, Ireland, Italy, Japan, the Netherlands, New Zealand, Spain, and the United Kingdom. CIEE semester or year programs are in Chile, China, Czech Republic, France, Ghana, Hungary, Poland, and Russia. Rochester is also a member of the Advanced Studies in England consortium, a semester or yearlong program focusing on medieval and Renaissance history and literature in Bath, Oxford, and Stratford.

Study abroad is open to all majors, and new programs are currently under development. The Center for Study Abroad’s advising staff works closely with students to enable them to find the program best suited to their academic interests.

**SUMMER STUDY**

Summer provides an opportunity for students to study abroad, concentrate on one or two classes, catch up, get ahead, or take a class of interest that normally would not fit into their schedules! Summer classes are offered May–August in 4-, 6-, or 12-week sessions. For more information or a complete listing of summer courses, visit www.rochester.edu/summer or call 585-275-2344.

**SPECIAL DEGREE PROGRAMS**

The interdepartmental degree programs (pages 77 and 156) provide students with an unusual opportunity to construct individual programs suited to their special talents and interests. Students are currently pursuing interdepartmental majors in culture and communications, computers in media, American studies, and Latin-American studies, among others. Faculty members related to the College Center for Study Abroad and Interdepartmental Programs assist undergraduates in developing their interdepartmental studies majors in the College’s arts and sciences. Students planning an interdepartmental program leading to a Bachelor of Science in engineering and applied science or the Bachelor of Arts in engineering sciences work closely with faculty members on the Interdepartmental Engineering Committee in the School of Engineering and Applied Sciences (page 156).

Two formalized special degree programs are health and society and the brain and cognitive sciences majors (pages 72 and 40). Students pursuing these majors design their own courses of study in consultation with faculty advisors affiliated with the program. Both majors offer students extensive opportunities to do independent work and to explore areas of special interest.

**HONOR SOCIETIES**

National academic honorary societies include Phi Beta Kappa, Golden Key, Tau Beta Pi (engineering), National Society of Collegiate Scholars (scholarship, leadership, and service), Beta Gamma Sigma (business, graduate students only), Sigma Theta Tau (nursing), and Alpha Omega Alpha (medicine), Sigma Pi Sigma (physics and astronomy).
Degrees are awarded by the University of Rochester in the following subjects, grouped by college or school of the University:

THE COLLEGE: ARTS AND SCIENCES

For purposes of the Rochester Curriculum, described on page 14, the distribution area is noted in which each degree program and minor in the College falls. H=Humanities, S=Social Sciences, N=Natural Sciences and Engineering, V=Variable (determined at time of official entrance into the program).

African and African-American Studies (B.A.)-V
American Sign Language (B.A.)-H
Anthropology (B.A.)-S
Art and Art History:
Art History (B.A.)-H
Studio Arts (B.A.)-H
Biological Sciences (B.S.), with specialties in:
   Biochemistry-N
   Cell and Developmental Biology-N
   Ecology and Evolutionary Biology-N
   Microbiology-N
   Molecular Genetics-N
   Neuroscience-N
   Biology (B.A., M.S., Ph.D.)-N
   Brain and Cognitive Sciences (B.A., B.S., M.A., Ph.D.)-N
Chemistry (B.A., B.S., M.S., Ph.D.)-N
Computer Science (B.A., B.S., M.S., Ph.D.)-N
Earth and Environmental Sciences:
   Environmental Science (B.S.)-N
   Environmental Studies (B.A.)-N
   Geosciences (B.A., B.S., M.S., Ph.D.)-N
Geomechanics (B.S.)-N
Economics (B.A., M.A., Ph.D.)-S
English (B.A., M.A., Ph.D.)-H
Film and Media Studies (B.A.)-H
Financial Economics (B.A.)-S
Health and Society (B.A.)-S
History (B.A., M.A., Ph.D.)-S
Interdepartmental Studies (B.A., M.A., M.S., Ph.D.)-S
Linguistics (B.A., M.A.)-S
Mathematics (B.A., B.S., M.A., Ph.D.)-N
Mathematics (Applied) (B.S., M.S.)-N
Mathematics-Statistics (B.A., M.A.)-N
Modern Languages and Cultures:
   Comparative Literature (B.A., M.A.)-H
   French (B.A., M.A.)-H
   German (B.A., M.A.)-H
   Japanese (B.A.)-H
   Russian (B.A.)-H
   Spanish (B.A., M.A.)-H
Music (B.A.)-H
Philosophy (B.A., M.A., Ph.D.)-H
Physics (B.A., B.S., M.A., M.S., Ph.D.)-N
Physics and Astronomy (B.A., B.S., Ph.D.)-N
Political Science (B.A., M.A., Ph.D.)-S
Psychology (B.A., M.A.)-S
Psychology, Clinical (Ph.D.)
Psychology, Developmental (Ph.D.)
Psychology, Social-Personality (Ph.D.)
Religion and Classics:
   Classics (B.A.)-H
   Religion (B.A.)-H
   Russian Studies (B.A.)-V
   Statistics (B.A.)-N
Visual and Cultural Studies (M.A., Ph.D.)
   Women's Studies (B.A.)-V
Certificate Programs (taken in conjunction with a bachelor’s degree)
   Actuarial Studies
   Asian Studies
   Biophysics
   Biotechnology
   International Relations
   Management Studies
   Mathematical Modeling in Political Science and Economics
   Medieval Studies
   Polish and Central European Studies
   Citation for Achievement in College Leadership

Minors
   African and African-American Studies-V
   American Sign Language-H
   Anthropology-S
   Arabic-H
   Art History-H
   Astronomy-N
   Biology-N
   Brain and Cognitive Sciences-N
   Chinese-H
   Classics-H
   Clinical Psychology-S
   Comparative Literature-H
   Computer Science-N
   Economics-S
   English Literature-H
   Environmental Geology-N
   Ethics-H
   Film and Media Studies-H
   French-H
   Geological Sciences-N
   German-H
   Greek-H
   Health and Society-S
   History-S
   History of Philosophy-H
   Interdepartmental Studies-V
   Italian-H
   Japanese-H
   Latin-H
   Latin American Studies-H
   Legal Studies-V
   Linguistics-S
   Marine Geology and Ecology-N
   Mathematics-N
   Medical Anthropology-S

Music-H
Organizational Psychology-S
Paleontology and Evolution-N
Philosophy-H
Philosophy of Science-H
Physics-N
Political Science-S
Psychology-S
Psychology as a Natural Science-N
Psychology as a Social Science-S
Religion-H
Research in Visual Science-N
Russian-H
Russian Studies-V
Social and Emotional Development-S
Spanish-H
Statistics-N
Studio Arts-H
Theater-H
Visual Science-N
Women's Studies-V
Writing-H

THE COLLEGE:
SCHOOL OF ENGINEERING
AND APPLIED SCIENCES

Biomedical Engineering (B.S., M.S., Ph.D.)-N
Chemical Engineering (B.S., M.S., Ph.D.)-N
Electrical and Computer Engineering (B.S.)-N
Electrical Engineering (M.S., Ph.D.)-N
Engineering and Applied Science (an Interdepartmental Program) (B.S.)-N
Engineering Science (B.A.)-N
Geomechanics (B.S.)-N
Materials Science (M.S., Ph.D.)-N
Mechanical Engineering (B.S., M.S., Ph.D.)-N
Optics (B.S., M.S., Ph.D.)-N

Minors
   Bioenvironmental Engineering-N
   Biomedical Engineering-N
   Chemical Engineering-N
   Electrical and Computer Engineering-N
   Environmental Engineering-N
   Materials Science-N
   Mechanical Engineering-N
   Optics-N

EASTMAN SCHOOL OF MUSIC

Applied Music (B.M.)
Composition (B.M., M.A., M.M., D.M.A., Ph.D.)
Conducting (M.M., D.M.A.)
Early Music, Emphasis in Historical Plucked Instruments (M.M., D.M.A.)
Ethnomusicology (M.A.)
Jazz Studies and Contemporary Media (B.M., M.M., D.M.A.)
Musical Arts (B.M.)
The second Ph.D. the University awarded, in 1927, went to Vincent DuVigneaud, who won the Nobel Prize in Chemistry. Recent Nobelists, both in physics, include Steven Chu ’70 in 1997 and Masatoshi Koshiba ’55 (Ph.D.) in 2002.

Music Theory (B.M., M.A., Ph.D.)
Musicology (M.A., Ph.D.)
Opera (M.M.)
Pedagogy of Music Theory (M.A.)
Performance and Literature (M.M., D.M.A.)
Piano Accompanying and Chamber Music (M.M., D.M.A.)

SCHOOL OF MEDICINE AND DENTISTRY
Biochemistry (M.S., Ph.D.)
Biophysics (M.S., Ph.D.)
Clinical Investigation (M.S.)
Dental Science (M.S.)
Epidemiology (Ph.D.)
Genetics (M.S., Ph.D.)
Health Services Research and Policy (Ph.D.)
Marriage and Family Therapy (M.S.)
Medical Statistics (M.S.)
Medicine (M.D.)
Medicine/Medical (M.S.)
Microbiology and Immunology (Ph.D.)
Neurobiology and Anatomy (M.S., Ph.D.)
Neuroscience (M.S., Ph.D.)
Pathology (M.S., Ph.D.)
Pharmacology (M.S., Ph.D.)
Physiology (M.S., Ph.D.)
Public Health (M.P.H.)
Statistics (M.A., Ph.D.)
Toxicology (M.S., Ph.D.)

SCHOOL OF NURSING
Bachelor Programs:
  Nursing—R.N. to B.S.
  Accelerated Program for Non Nurses
  Nursing (B.S.)/M.S. Accelerated Programs for Non Nurses:
    Nursing/Acute Care Nurse Practitioner
    Nursing/Adult Nurse Practitioner
    Nursing/Care of Children & Families—Pediatric Nurse Practitioner
    Nursing/Family Nurse Practitioner
    Nursing/Gerontological Nurse Practitioner
    Nursing/Mental Health Nurse Practitioner
  R.N. to B.S. to M.S. Programs:
    Nursing/Acute Care Nurse Practitioner
    Nursing/Adult Nurse Practitioner
    Nursing/Care of Children & Families—Pediatric Nurse Practitioner
    Nursing/Care of Children & Families—Pediatric Nurse Practitioner/Neonatal Nurse Practitioner
    Nursing/Family Nurse Practitioner
    Nursing/Gerontological Nurse Practitioner
  M.S. Programs:
    Acute Care Nurse Practitioner
    Adult Nurse Practitioner
    Care of Children & Families—Pediatric Nurse Practitioner
    Care of Children & Families—Pediatric Nurse Practitioner/Neonatal Nurse Practitioner
    Child & Adolescent Psychiatric Mental Health Nurse Practitioner
    Family Nurse Practitioner
    Gerontological Nurse Practitioner
    Psychiatry/Mental Health Nurse Practitioner (Adult/Family)
  M.S./Ph.D. Programs:
    Acute Care Nurse Practitioner/Nursing
    Adult Nurse Practitioner/Nursing
    Care of Children & Families—Pediatric Nurse Practitioner/Neonatal Nurse Practitioner/Nursing
    Care of Children & Families—Pediatric Nurse Practitioner/Nursing
    Family Nurse Practitioner/Nursing
    Gerontological Nurse Practitioner/Nursing
    Psychiatric/Mental Health Nurse Practitioner/Nursing
  Ph.D. Program:
    Health Practice Research

NURSES’ M.S. PROGRAMS:
  Nursing/Psychiatric Mental Health Nurse Practitioner

PHARMACOLOGICAL SCIENCES
Ph.D. Program:
  Pharmacology

SCHOOL OF EDUCATION AND BUSINESS ADMINISTRATION
Graduate School of Business Administration
  Business Administration (M.S., M.B.A., Ph.D., M.B.A./Master of Public Health, M.D./M.B.A., M.S. in Accountancy, and graduate-level certificate programs)

MARGARET WARNER GRADUATE SCHOOL OF EDUCATION AND HUMAN DEVELOPMENT
  Adolescence Education (M.S., M.A.T.)
  Childhood Education (M.S.)
  Community Mental Health Counseling (M.S.)
  Counseling and Human Development (M.S., Ed.D.)
  Early Childhood Education (M.S.)
  Education (Ph.D.)
  Educational Administration (M.S., Ed.D.)
  Gerontological Mental Health Counseling (M.S.)
  Human Development (M.S.)
  Inclusion Adolescence Education (M.S.)
  Inclusion Childhood Education (M.S.)
  Inclusion Early Childhood Education (M.S.)
  Inclusion Middle Childhood Education (M.S.)
  Mental Health Counseling and Supervision (Ed.D.)

UNIVERSITY-WIDE STUDIES
  Combined Bachelor’s Programs
    B.A. and B.S. in arts and sciences
    B.A. or B.S. in arts and sciences and B.S. or B.A. in engineering and applied sciences
    B.A. or B.S. in arts and sciences and B.M. in music
    B.S. in engineering and applied sciences and B.M. in music
  3-2 Programs
    B.A. and B.S. in engineering concentration (for transfer students)
    B.A. or B.S. plus an M.B.A.
    B.A. or B.S. plus a master’s in public health
    B.S. and M.S. in biological sciences—neuroscience
    B.S. and M.S. in biomedical engineering
    B.S. and M.S. in chemical engineering
    B.S. and M.S. in electrical and computer engineering
    B.S. and M.S. in mechanical engineering
    B.S. and M.S. in optics
  Combined Bachelor’s and M.D. Degree Program
    B.A. or B.S. plus an M.D.
  Concurrent Master’s Programs
    M.B.A. and M.S. in microbiology
  Inter-College Degree Programs
    Genetics (Ph.D.)
    Neuroscience (M.S., Ph.D.)

WILLIAM E. SIMON
GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

MIDDLE CHILDHOOD EDUCATION (M.S.)
  Middle Childhood Education (M.S.)
  Middle Childhood Education for Adolescence Education Teachers (M.S.)
  Middle Childhood Education and Adolescence Education (M.S.)
  Professional Study in Adolescence Education (M.A.T.)
  Professional Study: Early Childhood Education/ESOL (M.S.)
  Professional Study: Middle Childhood and Adolescence Education (M.S.)
  School Administrator and Supervisor (M.S., Ed.D.)
  School Building Leadership—Private Schools (M.S.)
  School Building Leadership—(M.S., Ed.D.)
  School District Leadership (M.S., Ed.D.)
  Teaching and Curriculum (M.S., Ed.D.)
  Teaching English to Speakers of Other Languages (M.S.)
  Teaching Literacy (M.S.)

DEGREES OFFERED 11
THE COLLEGE AND SCHOOL OF NURSING*

2007 FALL SEMESTER

September 4 (Tuesday)
Classes begin at the College and School of Nursing.

September 24 (Monday)
Last date for students in the College to add independent study courses.

October 1 (Monday)
Last date for students in the College to have courses deleted from current program.

October 5 (Friday)
Fall term break begins at close of classes for the College and School of Nursing.

October 9 (Tuesday)
Classes resume.

October 18–19
Registration materials distributed to undergraduates in the College.

October 29–November 2
Undergraduate program advising in the College.

November 5
Undergraduate registration begins.

November 21 (Wednesday)
Thanksgiving recess begins at noon.

November 26 (Monday)
Classes resume.

December 3 (Monday)
Last date for first-semester freshmen and transfer students in the College to declare the S/F option.

December 13 (Thursday)
Classes end. Last date for students in the College to withdraw from courses.

December 15 (Saturday)
Reading period ends.

December 16–22
Final examinations.

December 22 (Saturday)
Winter recess begins at end of day.

2008 SPRING SEMESTER

January 16 (Wednesday)
Classes begin at the College and School of Nursing.

January 18 (Friday)
Martin Luther King Day (observed)
Classes Canceled

February 6 (Wednesday)
Last date for students in the College to add independent study courses.

February 13 (Wednesday)
Last date for students in the College to have courses deleted from current program.

February 28 (Wednesday)
Last date for students in the College to add courses.

March 8 (Saturday)
Spring recess begins at close of classes.

March 17 (Monday)
Classes resume.

March 20–21
Registration materials distributed to undergraduates in the College.

March 31–April 4
Undergraduate program advising in the College.

April 7
Undergraduate registration begins.

April 16 (Wednesday)
Last date for first-semester freshmen and transfer students in the College to declare the S/F option.

April 30 (Wednesday)
Classes end. Last date for students in the College to withdraw from courses.

April 30 (Wednesday)
Reading period begins at close of classes (optional by college or school offering course).

May 4 (Sunday)
Reading period ends.

May 5–12
Final examinations.

May 17–18
Commencement Weekend.

2008 SUMMER

May 19–August 8
Full summer session

May 19–June 13
Session A-4

May 19–June 27
Session A-6

May 26 (Monday)
Memorial Day observed. No classes.

June 16–July 11
Session B-4

June 30–August 8
Session B-6

July 4 (Friday)
Independence Day. No classes.

July 14–August 8
Session C-4

2008 FALL SEMESTER

September 1 (Monday)
Labor Day. No classes.

September 2 (Tuesday)
Classes begin at the College and School of Nursing.

September 22 (Monday)
Last date for students in the College to add independent study courses.

September 29 (Monday)
Last date for students in the College to have courses deleted from current program.

*Eastman School of Music calendar differs slightly.
October 3 (Friday)
Fall term break begins at close of classes for the College and School of Nursing.

October 7 (Tuesday)
Classes resume.

October 23–24
Registration materials distributed to undergraduates in the College.

November 3–November 7
Undergraduate program advising in the College.

November 10
Undergraduate registration begins.

November 26 (Wednesday)
Thanksgiving recess begins at noon.

December 1 (Monday)
Classes resume.

December 1 (Monday)
Last date for first-semester freshmen and transfer students in the College to declare the S/F option.

December 11 (Thursday)
Classes end. Last date for students in the College to withdraw from courses.

December 11 (Thursday)
Reading period begins at close of classes (optional by college or school offering course).

December 14 (Sunday)
Reading period ends.

December 15–21
Final examinations.

December 21 (Sunday)
Winter recess begins at end of day.

2009 SPRING SEMESTER

January 14 (Wednesday)
Classes begin at the College and School of Nursing.

January 19
Martin Luther King Day
Classes Canceled

February 4 (Wednesday)
Last date for students in the College to add independent study courses.

February 11 (Wednesday)
Last date for students in the College to have courses deleted from current program.
Last date for students in the College to add courses.
Last date for students in the College to declare the S/F option.

March 7 (Saturday)
Spring recess begins at close of classes.

March 16 (Monday)
Classes resume.

March 18–19
Registration materials distributed to undergraduates in the College.

March 29–April 2
Undergraduate program advising in the College.

April 6
Undergraduate registration begins

April 15 (Wednesday)
Last date for first-semester freshmen and transfer students in the College to declare the S/F option.

April 29 (Wednesday)
Classes end. Last date for students in the College to drop courses without penalty.

April 29 (Wednesday)
Reading period begins at close of classes (optional by college or school offering course).

May 3 (Sunday)
Reading period ends.

May 4–11
Final examinations.

May 16–17
Commencement Weekend.

2009 SUMMER

May 18–August 7
Full summer session

May 18–June 12
Session A-4

May 18–June 26
Session A-6

May 25 (Monday)
Memorial Day observed. No classes.

June 15–July 10
Session B-4

July 3 (Friday)
Independence Day observed. No classes.

June 29–August 7
Session B-6

July 13–August 7
Session C-4
The College encompasses the disciplines of arts and sciences, as well as the departments within the School of Engineering and Applied Sciences, that together enroll the majority of University undergraduate and graduate students. For undergraduates especially, it is a college home at the heart of a nationally respected institution.

The College offers degree programs leading to the Bachelor of Arts and to the Bachelor of Science. In addition, it provides the first three years for students admitted to 3-2 programs offered in conjunction with other schools of the University, and the full course of study for 3-2 programs in computer science, engineering, neuroscience, optics, and applied mathematics.

THE ROCHESTER CURRICULUM

In the American system of education, college is the time in which a student’s intellectual growth and personal growth coincide—as he or she gains the ability to make a series of critical choices.

Most of education through the 12th grade, and most of graduate and professional training, is mandated by someone else—a school board, an accrediting agency, the demands of a profession or a career. In America, it is uniquely in the college years that students choose their subjects and thereby sharpen their interests, develop their skills, and focus their goals. Through the freedom of the so-called modular system of education that marks American undergraduate learning, students grow as thinkers and as persons.

The Rochester Curriculum takes the special character of college education seriously and attempts to craft a structure of learning that both respects the student as an individual learner and takes full advantage of Rochester’s character as a research university. University research/teachers are self-motivated learners, people who every day work to sharpen understanding and create new knowledge. More than any other group in society, a university research faculty knows how to make learning the habit of a lifetime. The basic aim of the Rochester Curriculum is to break down the barriers between the way the faculty learn and the students learn so that students can make not just the content, but also the practice, of disciplined learning their own. We do this through the Quest Program and the Rochester Curriculum, both of which are distinctive among American universities.

In the first years, students may enroll in Quest courses (described later in this section). With relatively small class sizes and tightly focused topics, the Quest courses introduce students to the way that faculty think and conduct their own research—in other words, to the special way that learning takes place at the college level.

As a student progresses at Rochester, he or she chooses a major, with at least 10 semester courses, in either the humanities, social sciences, or natural sciences (including mathematics and engineering). In addition, the student chooses a cluster of three related courses in each of the other two main divisions of the liberal arts named above.

More than 250 authorized clusters exist from which students may choose. Virtually every department and program in the College proposed these sets of courses to meet the spirit of the Rochester Curriculum, and the College Curriculum Committee reviewed and approved them. Complete descriptions can be found on the Web at www.rochester.edu/College/CCAS/clusters/. Examples from the humanities include Modern and Contemporary Literature, Japanese Language, Ethics and Values. From the social sciences division, examples include Applied Economics, African-American Politics, Psychology of Motivation. In the natural sciences division, examples include Mind and Brain, Foundations of Computer Science, The Nature of the Universe.

The opportunity exists for students to propose exceptions to already existing clusters, and—with the support of two faculty sponsors—students may also propose individualized interdepartmental divisional clusters. Final approval rests with the Curriculum Committee.
The Rochester Curriculum is simple, flexible, and reflects the true hallmarks of university life and learning—curiosity, competence, and community.

Curiosity—The most important discoveries in the history of science, the most enduring works of art and literature, and the most compelling theories of society are the consequences of curiosity—which brings with it scholarly or artistic energy and persistence that won’t let a question rest until it is answered. The freedom to follow one’s own curiosity is the prime motivator of faculty learning, and it works just as well for undergraduates as it does for faculty. Therefore, we do not restrict our students’ freedom with a system in which they must take required courses to “get them out of the way.” Instead, we ask students to take responsibility and build their college education out of their own interests, goals, and aspirations. Broad and free experimentation with ideas and subjects allows them to discover and sharpen their own interests and to learn their own strengths and weaknesses.

Competence—We believe that for students to understand how a field of learning actually works, they need to spend sufficient time in it to learn its language, become familiar with its artifacts, and experience its logic. The Rochester Curriculum allows them to do so—not just in their major, but also in two other fields across the liberal arts disciplines. A key mark of a Rochester education is a demonstrable competence in the three major realms of thought and analysis and the consequent ability to make informed intellectual connections across fields and disciplines.

Community—Curiosity does not thrive in isolation, and our researchers do not—indeed, cannot—work alone. Active participation in a community of inquiry and expertise, engagement in a heritage of curiosity, is a fundamental ingredient of the intellectual life in a research culture. By providing the framework for a major and two clusters, the Rochester Curriculum invites students into three different intellectual communities—three different sustained conversations about learning and ideas—during their undergraduate careers.

ARTS AND SCIENCES REQUIREMENTS FOR THE DEGREES BACHELOR OF ARTS AND BACHELOR OF SCIENCE

To ensure that students acquire a broad base of general knowledge, as well as extensive familiarity with at least one area of specialization, the College has established general degree requirements. These requirements are identical for the B.A. and B.S. degrees.

1. Completion of eight semesters of approved coursework, i.e., 32 4-credit courses or 128 credit hours, with an average grade of “C” or better. No more than 20 courses from a single department may be counted toward the degree. For students not majoring in music, no more than 16 credit hours of applied music instruction and 8 credit hours of River Campus ensemble may be counted toward the degree.

2. Primary Writing Requirement. Entering students fulfill the Primary Writing Requirement by earning a C or better in CAS 105, Reasoning and Writing in the College, or CAS 105E, an extended version of 105 developed for students whose placement results suggest that they need a more supportive first-year writing experience. CAS 105 and 105E introduce students to academic writing at the college level and provide instruction and practice in writing clear and cogent argumentative essays. Individual sections of 105 and 105E have unique discipline-specific content and themes designed by each instructor. For section titles and descriptions please visit http://writing.rochester.edu/courses/index.html. We encourage students to choose sections that interest them, whether this interest grows out of a desire to learn more about a favorite subject or to try something new.

Incoming freshmen who believe they are proficient college writers may petition to use a course other than CAS 105 or 105E to satisfy the Primary Writing Requirement. The course must involve a significant writing component, which usually includes several papers across the semester and a substantial research paper. The course used to satisfy the Primary Writing Requirement must be approved by the Writing Program (we recommend preapproval) and may not also be used to satisfy the Upper-Level Requirement. The student must earn a B in the alternate course in order to satisfy the Primary Writing Requirement.

3. Completion of the Rochester Curriculum. a. Satisfactory completion of a major with an average grade of “C” or better. Each major contains an upper-level writing requirement which explicitly incorporates student writing into its curriculum and/or requirements. Students file their major program approved by the appropriate faculty advisor in the department or program by the time noted below. The divisional classification of all interdepartmental majors, as noted in the following paragraph, is determined by the student and the faculty committee responsible for the major.

b. Satisfactory completion, with an average grade of “C” or better, of a divisional cluster composed of at least three courses in each of the two divisions outside the area of the major. Each set of courses for the divisional clusters will be in one of the three divisions: humanities, social sciences, natural science, mathematics, and engineering and applied sciences. Students may also construct a program from existing majors and minors, as long as the principle of distribution over the three divisions is maintained. Students who complete an engineering major that is professionally accredited need to complete only one divisional cluster outside the area of the major. Students formally declare their Rochester Curriculum, i.e., their major and two divisional clusters, not later than the beginning of their junior year (by the time 64 credit hours have been taken). Students may alter their program until the final semester of the senior year. The College transcript will reflect the student’s three areas of focus.

Departments of the College discourage students from registering for the next course in a continuing science sequence if an appropriate grade level (C–” or above) has not been achieved in the preceding course. It has been shown that a student’s success in such a sequence is directly related to performance in the preceding course. Students so advised are asked to seek assistance in their future program planning from the College Center for Academic Support and from their faculty advisors.

COLLEGE WRITING PROGRAM INFORMATION ABOUT THE PROGRAM

Faculty across the College agree that mastery of the skills of written argument, including critical thinking, problem solving, organization of ideas, and clarity and power of expression, is of enormous importance both in academic work during residence in the College and in the world beyond the College. Writing as part of college life is a given, whether by students completing required coursework, by scholars as part of their professional lives, or by those who find in writing a source of discovery and pleasure. Writing is how we know what it is that we know, because our ability to explain a subject clearly and precisely to others is an ultimate test of having learned it. To help students join Rochester’s community of writers and researchers, the Writing Program offers writing courses and writing support services, as well as opportunities to celebrate outstanding writers and their work.

COURSES

CAS 105 and CAS 105E both satisfy the Primary Writing Requirement. Each section has unique content. For an updated list of course descriptions, please refer to http://writing.rochester.edu/descriptions.html.

CAS 105—Reasoning and Writing in the College. Introduces students to disciplinary writing at the college level through instruction in small sections that focuses on the act of writing. Section topics range from “Truths and Lies of the Energy Crisis” to “The Art of Seduction in Advertising,” and cover a range of subjects and disciplines. The course provides instruction and practice in clear and effective writing and in constructing cogent and compelling arguments, as students draft and revise numerous papers of different forms and lengths. Students consider the roles of audience and purpose in shaping the organization,
style, and argumentative strategies of their own papers, while they learn to become critical readers of their writing through peer critiques and revision/editing workshops.

CAS 105E. Reasoning and Writing in the College. An extended version of CAS 105, CAS 105E also introduces students to disciplinary writing at the college level. CAS 105E courses differ in that they include an additional class section each week, are taught in computer labs, and are limited to 10 students. Places in these sections are reserved for students whose writing-placement results suggest the need for more support to meet the demands of college and professional writing.

Prerequisites for the following course: satisfaction of the primary writing requirement. By application only.

CAS 245/ENG 285. Advanced Writing and Peer Tutoring. This course prepares sophomores and juniors from the humanities, sciences, and the social sciences for work as writing fellows. The course design facilitates the development of a strong, intuitive writer and speaker in order to become a successful reader, listener, and responder in peer-tutoring situations. Ample writing and rewriting experiences, practice in informal and formal speaking, and the critical reading of published essays and student work enhance students' ability to become conscious, flexible communicators. Before tutoring on their own, students observe Writing Fellows and Writing Center consultants conduct tutoring sessions. On completion of the course with a B or better, Fellows should be prepared to accept their own hours as peer tutors.

FRESHMAN OFFERINGS

THE TRADITIONAL APPROACH

Students who desire maximum flexibility in course choice, the ability to start working toward a desired concentration from the first semester on, or the opportunity to build a general foundation according to their own special interests will want to consider the Traditional Approach. Assisted by an advisor, students following this approach choose an appropriate group of courses (usually four each semester) from the entire range of offerings open to freshmen. Some of these courses lay a basis for a choice of major. Others fulfill basic requirements for graduation and provide the first college-level steps toward a liberal education.

QUEST: A GATEWAY TO COLLEGE LEARNING

The Quest Program, now more than a decade old, offers first- and second-semester freshmen the opportunity to participate in a unique academic experience. Quest courses involve exciting work with original materials and data and encourage conversation and collaboration between teacher and student and among students themselves. Because of the small size of most Quest courses, students interact closely with their classmates and professor.

In the humanities Quest courses, students delve into analysis and interpretation of primary sources such as letters, authors' original writings and revisions, and films. In social sciences Quest courses, students scrutinize existing data, conduct research that yields new data, and learn techniques for data collection and analysis. Science and engineering Quest courses draw students into the generation and analysis of new experimental data.

When students study primary sources, their best insights typically occur when they review their material for a second (or third, or fourth) time. That's why Quest courses feature "recursion," the perspective of the second look.

All Quest courses share the skills that guide faculty researchers and scholars:
- How to define a question in a meaningful way.
- How to decide which arguments, evidence, data are required to best approach the problem.
- How to find the information—in library and computer databases, for example, or through the major literature sources in the field.
- How to sort evidence—by weeding out information that may be correct but irrelevant, and ranking the relevant evidence in order of importance.
- How to decide what can and what cannot be concluded. In other words, which caveats must be imposed on the conclusion?
- How to decide if the question has been answered. If it hasn't been, what further information is required? If it has been answered, what is the next good question?

Some Quest courses offered in 2006–2007 having no prerequisites include the following:

Life’s Structures: Mechanical Design in Nature and in the Technological World
This course discusses the mechanical aspects of design in the context of two areas in which most students have a very good intuitive understanding: structures built and used by humankind over the centuries and human and animal bodies. We examine how Newtonian mechanics, material behavior, energy requirements, size, and dimensional considerations define the boundaries of mechanical design in nature and in human technology. On the side of technology, the course studies the evolution of masonry buildings, of bridges, and of other structures. In the case of biological design, topics include bones and the skeletal system, the heart and the circulatory system, muscles, and soft tissues.

Population Growth: An Economic Perspective
The decision to procreate and to allocate resources to future generations is surely an economic issue. This course examines the questions raised by biologists,ographers, and economists on the causes and consequences of population growth. Students are asked to read the relevant literature on population growth, and to examine the available evidence on the causes of growth and the relationship of population growth to economic welfare. Students learn that the answer to the question "How many people can the earth support?" involves much more than the answers provided by Malthus or Paul Ehrlich in The Population Bomb.

Minds and Machines
What is it to have a mind? What is it to think? Is the best way to think about the nature of the mind to think about how one might build an intelligent computer? This course attempts to make some headway with these questions by way of four topics. First, a discussion of the mind-body problem. How are our minds related to our bodies? The course considers in depth an answer popular today amongst philosophers and taken for granted by many in cognitive science: that our minds are programs implemented on the hardware which are our brains. Second, a look at the history of artificial intelligence, paying attention to the various assumptions that have been in the background, to get a grasp on the prospects of this way of thinking about ourselves. Next, consideration of several challenges and objections to the computational theory of mind. Finally, investigation of the so-called ‘‘hard problem’’ of consciousness and evaluation of the prospects for developing a science of consciousness. No prior background in either philosophy or cognitive science is presupposed.

Cultural Anthropology
Cultural anthropologists study contemporary human societies and cultures at home and abroad. They learn about and write interpretations of particular sociocultural systems. They also compare sociocultural systems. At its best, cultural anthropology helps us step outside our own commonsense views of the world and see ourselves as others might see us. It makes the strange familiar and the familiar strange. Ethnographic fieldwork or participant observation is a defining feature of cultural anthropology. An ethnographic study involves being with the people one is studying while they are doing what one is studying in order to learn what it means from their point of view. It also involves looking at the things that people do in context, paying attention to the ways in which one thing they do is related to other things. This course introduces students to anthropology through ethnographic research. It gives students hands-on experience doing participant observation among some of the diverse cultures of Rochester. Some students may combine participant observation with community service.
Religion and Society in Modern Europe

Is religion a conservative force or a progressive one? Why do religious beliefs often lead to conflicts while preaching peace? How do religious beliefs shape history and how does history shape beliefs? This course seeks to answer these and other questions while introducing students to the research process in history.

The Philosophy, History, and Practice of Nonviolence

This course studies the origins and historical development of nonviolence in its twentieth-century manifestations, particularly in the works of Gandhi and Martin Luther King, Jr. and its prospects for the future in interpersonal, social, and international affairs. The moral assessment of nonviolence is of paramount concern. There are extensive class discussions and an emphasis on independent thought and research. Text: Nonviolence in Theory and Practice.

Russia Now

In this Quest version of Russia Now, students follow current events in Russia through Internet, print, and other sources and keep a journal of significant developments that form the basis for class participation. At the end of the term, students are familiar with the most important issues facing Russia and its neighbors today, and with the variety of available resources and the strategies required for judging between contradictory reports on the situation in Russia. Readings and discussions focus in particular on domestic politics, international relations, the economy, and social issues; other issues as they are relevant are included as well. Students meet in discussion sections twice a week and write several papers analyzing ongoing developments in Russia.

The History of the Book in the West

Discover the treasures in the Rush Rhees Library’s Manuscript Collection and learn how to analyze them in their historical context. Students study how to “read” the format and design of medieval manuscripts and later publications as well as how print affected European politics and society, particularly during the first three centuries after Gutenberg. Every class meeting involves a hands-on experience with materials from the Department of Rare Books, Special Collections and Preservation.

Dante’s Divine Comedy: A Journey from Inferno to Paradise

The objective of this course is to familiarize beginning students in the liberal arts with one of the most significant texts in Western Culture. Through Dante’s text, students gain a perspective on the Biblical, Christian, and Classical traditions as well as on the political, literary, philosophical, and theological context of medieval Europe. The course also provides students with an avenue of investigation on the problems of knowledge, and guides them in developing critical tools and research skills. Students with backgrounds or interests in the following are particularly welcomed to apply: Italian, history, classics, religion, philosophy, poetry, medieval studies, interdisciplinary studies.

Text: Nonviolence in Theory and Practice.

Quest Calculus 1

(Prerequisite: 3 or higher on AP Math AB exam or 2 or higher on BC exam or equivalent.) This is a Quest version of MTH 161. Emphasis is placed on understanding concepts as well as on learning techniques. Homework includes more challenging and occasionally more theoretical problems. Students contemplating majoring in mathematics as well as others desiring a strong foundation in calculus are encouraged to take this course.

Honors Calculus I

(Prerequisite: 2 or higher on AP Math BC or 3 or higher on AP Math AB or equivalent.) This sequence is an honors calculus sequence for talented students interested in mathematics or its theoretical understanding of calculus in addition to teaching technical skills. Students completing the sequence acquire a deep understanding of the subject. The sequence satisfies all the basic mathematical prerequisites for majors and minors in mathematics, physics, and engineering. These include single variable calculus (MTH 161–162), multivariable calculus (MTH 164), differential equations (MTH 163), and linear algebra (MTH 255).

Organic Chemistry and Organic Chemistry Lab

(Prerequisite: AP score of 4 or 5, or equivalent preparation.) There are millions of organic compounds of known structure and properties. Some are the naturally occurring components of living systems; others are the synthetic products of chemists’ skill and imagination. The proposition that chemical reactivity is a consequence of molecular structure is a powerful way to understand the observed properties of organic compounds and, in turn, the world in which we live. The fall and spring semester continuation courses are designed for first-year students with good preparation in chemistry. The sequence explores the basic observations, concepts, and laboratory practice of organic chemistry while carefully integrating key concepts from general chemistry. In lecture, workshop, and laboratory, these courses offer opportunities to grapple with issues central to all Quest courses: defining questions, constructing and testing hypotheses, evaluating evidence, weighing arguments, and reflecting on epistemological issues. The sequence meets all of the requirements for a year of organic chemistry with lab, and prepares students to enter upper-level chemistry courses.

EARLY CONNECTION OPPORTUNITY

The Early Connection Opportunity (ECO) program is designed to assist students in acquiring the attitudes, skills, and social connections necessary to become successful University of Rochester students. The program provides supplemental academic support to selected pre-freshmen during a three-week summer program. ECO is a residential program that takes place in the month of July. Students admitted through the Higher Education Opportunity Program are required to attend as a condition of admission, and others are invited who we believe would profit from the connections that can be made during this program. Enrollment is limited. No fees, no tuition, and no room and board costs are charged to participating students. Students are responsible for transportation costs to and from Rochester and all other personal expenses.

Model courses in selected areas, such as mathematics, writing, literature, and biology and chemistry are offered. A series of workshops on strategies and tactics to promote academic success and using the University’s computer facilities are also offered. Courses are taught by instructional faculty representing various departments in the University. Upon successful completion of ECO courses students earn 4 credits (the equivalent of one full college course). One or 2 credits may be earned in follow-up courses during the academic year.
EXTRA-DEPARTMENTAL COURSES

Each semester the College offers a variety of courses that are unique or interdisciplinary in nature, reflecting the current interests of students and faculty. These courses are listed under the heading CAS in the Schedule of Courses, the Course Description Handbook, and in the Registration and Resource Guide for nonmatriculated students. Expanded descriptions of these and other noncredit professional and personal development courses are available each semester, and questions regarding these courses may be directed to the Office of Special Programs in Lattimore Hall.

ACHIEVEMENT IN COLLEGE LEADERSHIP

The Citation for Achievement in College Leadership Program offers students the opportunity to develop their leadership skills through “leadership experiences” that combine specific academic study with specific practical application.

COMMITTEE ON ACHIEVEMENT IN COLLEGE LEADERSHIP

Joseph P. Dinnocenzo, Ph.D. (Cornell)
Professor of Chemistry and Chair of the Committee

Anthony J. Olek, Ph.D. (SUNY, Albany)
Senior Lecturer in Biology

Deborah Rossen-Knill, Ph.D. (Minnesota)
Director of College Writing Program

Vicki Roth, M.A. (Minnesota) Assistant Dean of Learning Assistance Services; Dean of Sophomores

REQUIREMENTS FOR A CITATION FOR ACHIEVEMENT IN COLLEGE LEADERSHIP

Students interested in the citation need to successfully complete at least three different leadership experiences from the approved list available in the Center for Academic Support. Each leadership experience has two components:

1. An academic course (2-credit minimum) designed to prepare students for specific leadership work.
2. A specific leadership practicum which implements ideas from the preparatory course.

The Citation for Achievement in College Leadership is administered through the College Center for Academic Support. Students who plan to enroll in the program should pick up a registration form at the Academic Services Counter outside 312 Lattimore Hall. No later than the spring semester of the junior year, students should meet with an advisor in Academic Support to review and submit the completed registration form.

Upon graduation, students successfully completing the Citation for Achievement in College Leadership receive a notation on their official transcript.

ACTUARIAL STUDIES

The College offers a certificate in actuarial studies for students contemplating a professional career in the insurance industry. The program is organized by a committee of representatives from the Departments of Statistics, Mathematics, and Economics, with one member designated as program advisor, and administered through the College Center for Academic Support (in 312 Lattimore Hall). Ordinarily, interested students should apply by March 1 of their junior year.

COMMITTEE ON ACTUARIAL STUDIES

Professor of Statistics and of Biostatistics; Chair of the Committee and Program Advisor

Sanford L. Segal, Ph.D. (Colorado) Professor of Mathematics

REQUIREMENTS FOR A CERTIFICATE IN ACTUARIAL STUDIES

The course requirements are:

- Five core courses:
  1. STT 212 or ECO 231 (prerequisites for ECO 231: ECO 207, ECO 230, STT 213)
  2. MTH/STT 201 (prerequisites: MTH 162 or equivalent, MTH 164 recommended)
  3. MTH/STT 205 (prerequisite: MTH/STT 201)
  4. MTH 164 (prerequisite: MTH 143, 162, or 172)
  5. FIN 205 or MTH 210 or ECO 216 (prerequisites: ECO 207, 230 or equivalent). (ECO 216 no longer offered.)

- Two additional courses (totaling at least six credits):
  One from the following list:
  - MTH/STT 208, MTH/STT 280, STT 216, 221
  - ECO 236 or Independent Study (approved by the program advisor)

For certification, students must complete these course requirements with a grade-point average of 2.5 or higher. None of the certificate courses may be taken satisfactory/fail. In addition, some proficiency in a high-level computer language is required. CSC 108, 171, ECE 171, STT 277, and 278 are among the courses that may be used to satisfy the computing requirement. (Please note: Course substitutions may be possible with the approval of the program advisor.)

Many insurance companies offer summer internships for students contemplating the actuarial profession. Such an internship may provide important additional training, as well as summer income.

The Society of Actuaries is the professional organization of actuaries in the United States and Canada. To become an Associate Member of the Society, one must pass a series of examinations. Some or all of these may be taken while employed, after college graduation; some may be taken while still a student. The first examination is in calculus and linear algebra, and the courses MTH 161, 162, and 164 provide most of the necessary background. The second examination is in probability and statistics, covered by courses MTH/STT 201 and 203 and STT 212 or 213. Certificate students could, and are strongly encouraged to, take the first two examinations before, or upon, graduation. The exams are given three times a year: February, May, and November.

At graduation, students successfully completing the actuarial studies program receive a certificate in their departmental diploma ceremony.

AFRICAN AND AFRICAN-AMERICAN STUDIES


CORE FACULTY AND ASSOCIATES

John Michael, Ph.D. (Johns Hopkins) Professor of English
Sharon Willis, Ph.D. (Cornell) Professor of French and of Visual and Cultural Studies
Signithia Fordham, Ph.D. (American University) Associate Professor of Anthropology
Larry E. Hudson, Jr., Ph.D. (Keele University, UK) Associate Professor of History
Cilas Kemedjio, Ph.D. (Ohio State) Associate Professor of French; Curriculum Director
Anthea Butler, Ph.D. (Vanderbilt) Assistant Professor of Religion
Joan Saab, Ph.D. (N.Y.U.) Associate Professor of Art History and of Visual and Cultural Studies
REQUIREMENTS FOR CONCENTRATION IN AFRICAN AND AFRICAN-AMERICAN STUDIES

Ten courses are required for a concentration in African and African-American studies:

1. One course from the following list:
   • History 105 (AAS 141). African-American History I
   • History 166 (AAS 142). African-American History II
   • History 106 (AAS 106). Colonial and Contemporary Africa
   • History 110 (AAS 110). Introduction to African and African-American Studies

2. AAS 297. Colloquium in African and African-American Studies

3. Seven electives in African and African-American studies as indicated by AAS cross-listings of which
   • Not more than two can be at the 100 level
   • At least four must be grouped in social sciences or humanities
   • At least one must address foundational or methodological issues in an established discipline. See the curriculum director for a list of possible courses that satisfy this requirement in specific disciplines.

4. The Senior Seminar or the Senior Tutorial when the seminar proves impossible or impractical.

THE UPPER-LEVEL WRITING REQUIREMENT

The upper-level writing requirement is satisfied by the Colloquium and the Senior Seminar.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

102. Language and Social Identity in the United States. This course examines the relationships between language and social diversity in the general American speech community. Its aim is to shed light on how individuals and social groups distinguish themselves on the basis of their choice of language and their sharing (or lack of it) of a common norm of social evaluation and interpretation. Same as LIN 102. (Fall)

106. Colonial and Contemporary Africa. The course explores the impact of capitalism on African socioeconomic institutions during and after the era of formal colonialism. Same as HIS 106. (Fall)

107. History of Islam. This course traces the development of the religion of Islam from its origins in the Qur’an and Muhammad’s teachings, through the codification of the classical tradition in its various forms, and finally to the living Islam of the contemporary world. Same as REL 107. (Fall)

141. Afro-American History I. The course considers the cultural and political development of Africans in America from the seventeenth century to the end of the nineteenth century. Same as HIS 165. (Spring)

142. Afro-American History II. An examination of some of the most salient issues of American society since 1900. The course begins with an examination of those changes—political, psychological, social, attitudinal, and geographical—that Americans, black and white, have experienced. It then examines the ideologies that have guided racial advancement efforts and organization upon their inception, as well as state and federal policies in regard to equality. The problems of segregation and discrimination are discussed in depth, along with interracial efforts that have promoted equality of opportunity and equal justice. This course is intended for students with an interest in twentieth-century America. Same as HIS 166. (Spring)

151. The Blues. The course is about the history and influence of the music known as “the Blues.” The course covers development of the blues from the earliest practitioners to recent developments. Same as REL 151. (Spring)

156. Introduction to African-American Literature. This is a survey course that examines various fiction and nonfiction texts by African-American writers from the eighteenth century to the present. Same as ENG 156. (Fall)

175. Environment and Food Security in Africa. This course introduces key issues in the relationship between the environment and food security in Africa. Topics to be covered include population pressure, land alienation, cash-crop agriculture, new markets, and their impact on the ability of African farmers to manage their ecosystems. Same as HIS 175. (Spring)

185. African-American Religious History. Religion is an integral part of the lives and history of the peoples of the African Diaspora. Peoples of African descent in the Americas from the beginnings of slavery to the present have both embraced and contested religion, and it is this historic tension between African Americans’ use and experience of religion as both oppressor and liberator that forms the foundation of the class. Same as REL 185. (Spring)

194Q. Rochester Politics and Places. Home to Frederick Douglass, Susan B. Anthony, and George Eastman, upstate New York has been the seedbed for many of the most important events in American history. In this seminar, students discover the rich history of Rochester as well as learn about current debates over political organization, racial and economic segregation, suburbanization, and economic change. The course emphasizes five major themes: urbanization and religious revivalism in the 1820s and 1830s; movements for abolition and women’s rights; reform initiatives during the Progressive Era; economic and racial changes in the twentieth century; and city politics in the twentieth and twenty-first centuries. As part of the course, students visit sites in and around the city as well as meet and talk with political figures active in the city today. Same as PSC 225. (Fall)
202. The Third World. The concept of a Third World. The origins of colonialism and “underdevelopment” in the rise of European capitalism. The struggles of the colonial and postcolonial peoples for political independence, cultural autonomy and economic development. Same as HIS 201. (Spring)

216. Topics in African and African-American Life and Culture. The primary goal of this course is to provide an introduction to the interdisciplinary approach to the study of issues in African and African-American life and culture. Students attend talks given by visiting speakers, meet, discuss, and respond to issues raised. (Fall and Spring)

220. Social Movements in the United States. This course surveys social movements in the United States mostly from the twentieth century, including Populist, labor, civil rights, and women’s movements. Same as PSC 220.

224. African-American Politics. This course surveys the political strategies adopted by African-Americans since Reconstruction to forge organized resistance to racial domination in the United States. Same as PSC 224.

225. Race and Political Representation. The course introduces democratic theory, the civil rights movement, the voting rights act, African-American public opinion and electoral behavior, and the effect of electoral rules and districting decisions on representation. Same as PSC 225.

226. Black Paris. This course is a study of black Paris, as imagined by three generations of black cultural producers from the United States, the Caribbean, and Africa. Paris was a place of personal and artistic freedom that African-American writers, soldiers, and artists were denied back home. For colonized Africans and Caribbeans, Paris was the birthplace of the Negritude, the ultimate cultural renaissance influenced by the Harlem Renaissance. From Josephine Baker, Richard Wright, James Baldwin to Shay Youngblood’s Black Girl in Paris, from Aime Cesaire to Maryse Conde, from Bernard Dadie’s An African in Paris, and to contemporary Franco African writing, we investigate how the representation of Paris functions in the construction of black identities. Readings include Black Girl in Paris (Shay Youngblood), Desirada (Maryse Conde), The Josephine Baker Story, Paris Noir: African Americans in the City of Light (Tyler Stovall), and An African in Paris (Bernard Dadie). Same as FR 247. (Spring)

228. Martin and Malcolm in America: Religion in the Civil Rights Movement. Martin Luther King Jr. and Malcolm X are icons of the civil rights movement, in part because of their religious beliefs and their deployment of belief in advocating for civil rights for African Americans. This course explores the religious biographies of MLK and Malcolm X, placing their lives in comparison to the broader civil rights movement and the roots of religious motivation and dissent that fueled the ferment of change. Same as REL 226. (Fall)

229. Contemporary Black Women Writers. In recent decades some of the most powerful and innovative American literature has emerged from black women. This course focuses on the social and political contexts of Civil Rights, the Black Power movement, and debates about feminism to ground readings of such authors as Gayl Jones, Toni Morrison, Angela Davis, and Ntozake Shange. Special attention is paid to the dynamics between black men and women, the balance between self-fulfillment and family responsibilities, modes of resistance, and the emotional legacies of slavery. Students are expected to be active participants in this discussion-based seminar. Same as ENG 230. (Spring)

232. Populations and Resources: A Twenty-First-Century Country Study. The relationship between a country’s economy, natural resources, and social factors are studied. Students select individual sectors to research and work with a simulation model to predict conditions in the country to the year 2050, and assess policy options. (Fall)

236. Introduction to Francophone Literature. This course surveys Francophone African and Caribbean literature from its beginnings in the 14th to the postcolonial age. We study major trends and texts that have shaped the emergence of a genuine Francophone literary tradition. Same as FR 271. (Fall)

243. Muhammad and the Qur’an. This course is a study of the prophet Muhammad, the Qur’an, and their importance to medieval and modern Muslim culture. The prophet’s life and major themes of the Qur’an are discussed together with interpretations of them found in Islamic legal, theological, philosophical, and mystical writings. Same as REL 240W. (Fall)

245. African-American Drama. Surveys the entire tradition of African-American drama, including works by James Baldwin, August Wilson, and many others. Same as ENG 247. (Spring)

246. Cry Freedom: Liberation Theologies of Africa and the Americas. This course examines various theologies of liberation including writers from South Africa, Latin America, and men and women from North America. Same as REL 234. (Fall)

247. Harlem Renaissance: Reflection and Refraction. This course provides a survey of texts that reflect the spirit of the era, from writers such as Jessye Fauset, Langston Hughes, Zora Neale Hurston, Nella Larsen, Alain Locke, and Jean Toomer. In addition, the course considers later works that are set in this milieu to ascertain what the Harlem renaissance has meant for later writers such as Samuel R. Delany, Toni Morrison, and August Wilson. Special attention is paid to the subject of migration, constructions of black identity, and to the ways in which both sets of texts address differences within black America. Same as ENG 246. (Spring)

249. The Civil War. This course examines the events that led to the Civil War and the war’s impact on the nation’s political, social, and economic order. Same as HIS 249. (Fall)

252. Economics and Society of Latin America and the Caribbean Since 1492. Provides an historical explanation for the general problem of material poverty and the attendant sociopolitical crises that characterize contemporary Latin America and the Caribbean. Same as HIS 203. (Fall)

253. Economics and Social Conditions of African-Americans in the Twentieth Century. Study of selected topics concerning the conditions of African-Americans in the United States during the twentieth century. Topics include education, incomes, housing, family patterns, etc. Same as ECO 253. (Spring)

256. History of Race in America. This course identifies salient moments in the nation’s history when race functioned as an organizing principle in the construction of American public and private institutions. Same as HIS 258. (Fall)

260. Africa’s Sleeping Giant—Nigeria Since the Islamic Revolution of 1804. The course is taught in the context of the world economic order, its evolution from the sixteenth century and the location of different parts of the world within it. Nigeria, the most populous country in Africa, is blessed with vast mineral resources, which include petroleum, natural gas, coal, iron ore, and others. It has agricultural lands capable of producing a wide variety of tropical products and foodstuffs. Same as HIS 258. (Spring)

261. Islam in and out of Africa. Highlighting the importance of transnational Muslim networks in an increasingly globalized world, this course introduces students to both the anthropological study of Islam and the history and culture of Islam in Africa. Permission of instructor required for freshmen. Same as ANT 260. (Fall)

264. Representing Race in American Culture. In this course students confront and analyze a wide assortment of influential representations of race, especially, but not exclusively, representations of African-Americans drawn from the long history of this nation’s racialized struggles. Examples are drawn not only from literature and film but also from history, sociology, and popular discourses. We consider the ways in which both black and white Americans have constructed representations of African and African-American identity in the U.S. public sphere, and the ways in which those representations have reflected and helped shape the problems and promises of race in America. We also consider constructions of race in a global and comparative context. Same as ENG 264. (Spring)

265. Comparative Perspectives on Race, Culture, and Politics. Examines the formation of racial solidarity in the political sphere, state policies regarding racial inequality, and how race as a social construct oper-
ates as a political resource for racially domi-
nated groups and for institutionalized political
entities. The course covers the United States,
South Africa, the United Kingdom, Brazil, and
others. Same as PSC 265. (Fall)

271. Civil Rights in America. This course
examines the civil rights movement in twen-
tieth-century America, focusing on the post-
1945 period. Following the call to view civil
rights from a local perspective, the focus is a
comparative study of the movement in a vari-
ety of locations: from the rural south to the
urban north. In addition to examining the
nonviolent struggle for integration in the
South, activists’ demands for better hous-
ing, jobs, and economic parity nationwide
are reviewed. Rather than viewing the black
power movement as a separate, and divisive,
struggle the course interweaves the history of
black power and self-determination with the
history of civil rights activism. Although
the course focuses on the post–World War II
period, roots of the movement in early twen-
tieth-century struggles for justice are also
discussed. Same as HIS 271. (Fall)

277. Energy Resources and Utilization.
Emphasis on technical and developmental
aspects of energy resource problems; con-
sideration of quality-of-life impacts of energy.
Cross-listed with CHE 277. (Spring)

280. Madness and Postcolonial Lit-
terature. This course explores inscriptions of
madness in postcolonial African and Caribbean
texts. Beyond the obvious and visible signs of
what is generally termed “madness” (from the
pathological to the political or cultural), we
ask ourselves if the postcolonial arena cannot
be interpreted as a pervasive manifestation
of madness, that is to say, of something funda-
mentally “alien, foreign” to the Known, to the
imperial destructuring order, and to the disar-
ticated colonial and post-independent com-
munities. Same as FR 272. (Spring)

Contexts. This course is a study of the Fran-
cophone African novel from north sub-
Saharan Africa and from Madagascar. The
course explores the political and cultural con-
texts that gave rise to modern African liter-
ature in general, and to the modern African
novel in particular. Same as FR 278. (Fall)

297. Contemporary Issues in African-
American Life and Culture. The course
discusses and disagrees a selection of texts
considered crucial for the understanding of
the black experience in America from 1619
to the present. Same as HIS 297. (Fall and
Spring)

335. Major Literary Figure: James
Baldwin. Heralded as one of the most prolific
and versatile writers in American letters of
the twentieth century, this course examines James
Baldwin’s writings. We read Baldwin within
various theoretical and ideological frameworks
including, but not limited to, Marxist,
psy-
chanalytic, black feminist, queer, and Black
Nationalism. Same as ENG 335K. (Spring)

343. Race and the American City. Race
has played a major role in defining the physi-
cal, cultural, and political environment of
American cities. This course explores the role
of race in urban history in the nineteenth and
twentieth centuries. Cities were utopian des-

tinations for generations of immigrants and
native-born African-Americans. Yet, those same
cities were marked by racial prejudice, concent-
trations of poverty, and political corruption.
The course examines these contradictions by
analyzing the experiences of African-American,
Latino, and Asian residents of urban centers.
Same as HIS 343W (Spring)

350. Criticism and Culture: Black Mas-
culine and Culture. Surveys the literature (fction,
nonfiction, contemporary films) of and about
African-American males. Begins with the slave
narrative and the history of the slave culture,
and explores the African-American male’s his-
torically racist, oppressive, and capitalist rela-
tionship to white America and his often sexist
relationship with the African-American female.
Same as ENG 350. (Spring)

351. Issues in Literature and History:
African-American Feminists. In this course,
students read and analyze primary texts—fic-
tion and nonfiction—written by nineteenth-
and early twentieth-century African-American
women, who practiced and promoted feminist
principles in their writings, speeches, art, the-
ories, and social and political activism. Same as
ENG 351. (Spring)

356. The Black Family in Slavery and
Freedom. After a discussion of the Moyni-
han Report controversy and an assessment of
the literature on the black family, the read-
ings investigate why and how stable black fam-
dies were encouraged and how they devel-
op under slavery. The impact of factors such
as economics, politics, religion, gender, medi-
cine, and the proximity of free families on the
structure of the black family are given spe-
cial attention. In this way, the structure of the
slave family on the eve of emancipation and its
preparedness for freedom are tested and
assessed. Students are encouraged to ident-
ify persistent links between the “history of slav-
y and the black family and the development of
social policy. Same as HIS 340. (Fall)

371. Evolution of the World Eco-

omy Since the Sixteenth Century.
Seminar course. Course deals with the eco-

omy between the developed and less
developed parts of the world since the
twentieth century. Same as HIS 357W (Spring)

372. America at War: The Civil War and
Reconstruction. The course identifies and
discusses causes, conduct, and consequences of
the Civil War, and examines changing ideas
about nation and nationalism, and perceived
differences between northerners and south-
erners. Same as HIS 339. (Fall)

373. North Africa and the Middle East
in the Age of Imperialism. The social,
political, and economic consequences of the
region’s incorporation into the capitalist world

economy from the early nineteenth century
to the present. Analysis of major changes of
the period highlights not only the logic of
imperialism, but also the dynamics of the pre-
existing sociopolitical and religious structures.
Same as HIS 344W (Spring)

375. The Atlantic Slave Trade and
Africa, 1650–1850. Seminar course. Exam-
ines the level of socioeconomic development in
Africa by the late fifteenth century, relative
to the other major regions of the world at the
time. The effects of the “production” of capt-
tives for export on social and political struc-
tures, and the overall economic consequences
of the trade in Africa are also examined. Same
as HIS 350W (Fall)

380. Senior Seminar. Students draw upon
their exposure to the theory methods of Afri-
can and African-American studies to produce
an interdisciplinary research paper on a topic
of their own choosing.

INDEPENDENT STUDY AND RESEARCH

391. Independent Study: Hydrocarbon
Energy for African Development. Inde-
pendent studies on some aspect of the prob-
lems of energy resource development in lower-income countries, solutions to it, and
relationship to development issues, including
work with the instructor’s Access to Hydro-
carbon Energy for African Development proj-
ect, can be done within this course. Same as
CHE 393.

393. Senior Project. May be an inde-
pendent course with a faculty sponsor or
may be taken in an advanced research sem-
in in which the student elects to write the
essay but not to do all the required readings;
as such it does not meet the 300-level seminar
requirement, but it may be used as a distribu-
tion requirement within the area.

394. Internship in African and African-
American Studies. Experience in an applied
setting supervised on site. Approved and over-
seen by a University instructor.

ADDITIONAL COURSES

AAS 104. Contemporary Issues in
Anthropology. Same as ANT 104. (Fall)
AAS 133. Making the News: Eurocen-
trism and the Media. Same as ANT 207.
AAS 150. Topics in Afro-Hispanic Litera-
ture. Same as LIT 150. (Spring)
AAS 210. American Culture. Same as ANT
245. (Spring)
AAS 215. Race and Gender in Afro-
American Literature. Same as SP 288/CLT
217. (Spring)
AAS 219. Special Problems in Applied
Research Methodology. (Fall)
AAS 222. Afro-American Literature:
Autobiography and Beyond. Same as ENG
226. (Fall)
AAS 230. Economics of Afro-American Slavery. Same as ECO 228. (Fall)
AAS 259. African-American Women’s History. Same as HIS 259. (Fall)
AAS 264. Urban Economics: Prospects for Metropolitan America. Same as ECO 264. (Spring)
AAS 278. Islam and the Third World. Same as REL 247. (Fall)
AAS 287. History of the American South, 1792-1896. Same as HIS 253. (Fall)
AAS 288. History of the American South II. Same as HIS 254. (Spring)
AAS 335. Major Literary Figures: Toni Morrison. Same as ENG 335. (Spring)
AAS 349. Plantation Societies in the Americas. Same as HIS 337. (Spring)
AAS 354. State and Revolution in Southern Africa. Same as HIS 343. (Spring)
AAS 372. The Civil War: A Search for National Unity. Same as HIS 359. (Spring)
AAS 384. Food Crisis in Africa. Same as HIS 346. (Fall)
AH 128. Modern Art. (Fall)
AH 255. American Art. (Spring and Fall)
AH 259. Quilts in Women’s Lives: A Social and Feminist History. (Fall)
ANT 101Q. Cultural Anthropology. (Fall)
ANT 191. Rural Poverty: Invisible Poor. (Spring)
ANT 205. Theories and Debates in Anthropology. (Spring)
ANT 241. Anthropology of Urban Life. (Spring)
ANT 246. Families, Households, and Gender. (Spring)
DAN 341. World Dance Form. (Spring)
ECO 227. American Economic Growth. (Spring)
ECO 271. Economics of Human Behavior. (Spring)
ENG 224. American Contemporaries. (Fall)
ENG 229. Contemporary Women’s Writing. (Fall)
ENG 355R. Faulkner and Morrison: The Ordeal of Race. (Fall)
ENG 372A. Gender Writing and Representation. (Fall)
FS 131. Introduction to Media Studies. (Spring)
HIS 301W. History Seminar. (Fall)
MUR 103. Musical Adventures. (Fall)
MUR 121. Worlds of Music. (Spring)
MUR 122. History of Jazz. (Fall)
PHL 103. Contemporary Moral Problems. (Spring)
PHL 116Q. Philosophy, History, and Practice of Nonviolence. (Fall)
PSC 202. Argument in Political Science. (Spring)
REL 235. Religion and Society in Latin America. (Spring)
WST 100. Introduction to Women’s Studies. (Spring)
WST 235. Contemporary Women Novelist. (Fall)

**AMERICAN SIGN LANGUAGE**

Elissa L. Newport, Ph.D. (Pennsylvania)  
George Eastman Professor of Brain and Cognitive Sciences and Professor of Psychology  
Ted Supalla, Ph.D. (California, San Diego)  
Associate Professor of Brain and Cognitive Sciences and of Linguistics; Director of the Program  
Deirdre Schlehofer, M.Phil. (Bristol) Senior Lecturer in American Sign Language  
Lisa Johnston, M.A. (Arizona) Senior Lecturer in American Sign Language  
Part-time faculty also teach several of the basic language courses.

The American Sign Language Program provides students the opportunity to develop an integrated base of liberal arts and sciences in the study of American Sign Language (ASL), the indigenous visual-gestural language developed and used by the Deaf community in most areas of North America. The program offers a major, minor, and clusters in American Sign Language.

**LANGUAGE INSTRUCTION**

The program offers five semesters of language instruction in ASL, which gives students sufficient facility in the use of ASL to converse with ease and to pursue advanced study of the structure of signed languages, and of deaf people, their history, cultural institutions, and literary achievements. Except where indicated, the advanced courses in the program require basic competence in ASL, as lectures and classroom discussions are conducted exclusively in ASL without interpretation into spoken English.

**ADVANCED COURSES OF STUDY**

The student is expected to meet a level of ASL fluency (by completing ASL 105 or 106 or with permission of the instructor) before taking any advanced course, except where indicated (e.g., ASL 200). Students can choose 200-level courses from a variety of areas. Literature courses examine literary forms of ASL of all kinds, from poetry to theater. Culture courses permit the student to understand and appreciate the heritage of deaf people in America. Language sciences courses provide further study of ASL itself—its production, history, and structure. The ASL Program thus offers a strong educational foundation for students interested in entering the field of deafness as sign language interpreters, instructors, counselors, government specialists, audiologists, speech pathologists, program administrators, community service personnel, and many other positions, or for entering advanced study in the cognitive and language sciences.

**CLUSTERS FOR GENERAL EDUCATION REQUIREMENTS**

Three clusters are available to students to meet general education requirements.

**Humanities Cluster: Basic Proficiency in American Sign Language**
- ASL 101. Beginning American Sign Language I
- ASL 102. Beginning American Sign Language II
- ASL 105. Intermediate American Sign Language I

**Humanities Cluster: Advanced Proficiency in American Sign Language**
Three from the following list:
- ASL 105. Intermediate American Sign Language I
- ASL 106. Intermediate American Sign Language II
- ASL 200. Sign Language Structure
- ASL 201. Introduction to ASL Literature
- ASL 203. Advanced American Sign Language
- ASL 205. Art of Translation: ASL and English

**Social Sciences Cluster: Deaf Culture Studies**
- ASL 201. Introduction to ASL Literature
- ASL 202. History and Culture of the Deaf Community
- ASL 250. Sociolinguistics of the Deaf Community

**REQUIREMENTS FOR A CONCENTRATION IN ASL**

**Six Core Courses**
- ASL 101. Beginning American Sign Language I
- ASL 102. Beginning American Sign Language II
- ASL 105. Intermediate American Sign Language I
- ASL 106. Intermediate American Sign Language II
- ASL 203. Advanced American Sign Language
- ASL 200. Signed Language Structure

**Six Advanced Elective Courses**
ASL concentrators are required to take two courses on literary and cultural aspects of ASL, two courses on linguistic and psycholinguistic aspects of ASL, and two additional courses from either of the two groups above, or from pedagogy and related topics.

**REQUIREMENTS FOR A MINOR IN ASL**

The minor in ASL requires six classes: three basic/intermediate-level language classes (ASL 101, 102, and 105), and three elective courses selected from the core and elective courses. The purpose of this minor sequence is to provide students with basic knowledge of the rich...
heritage of deaf people and their language and to enable students to think critically about what it means to be a member of the deaf community.

UPPER-LEVEL WRITING REQUIREMENT

ASL majors can satisfy the upper-level writing requirement by taking two of the following courses: ASL 200, ASL 201, ASL 220. These courses include substantial writing assignments where the instructor provides feedback allowing the student the opportunity to rewrite assignments.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

Note: To maintain signing skills, ASL students must continuously take classes in which the language of instruction is ASL. ASL 101–106, and the 200-level ASL classes (not including ASL 200, 208, and 260). To enter any of these classes, students must have taken a signing class in the immediately preceding semester or obtain permission of the instructor.

101. Beginning American Sign Language I. An introductory course in American Sign Language. Consists of a preparatory phase to attune students to communication in the manual-visual mode, followed by instruction and practice in vocabulary, sentence structure, elementary conversation, and literature. In addition, the course provides a survey of various issues raised by examining ASL and the Deaf community. Prerequisite: none (Fall and Spring)

102. Beginning American Sign Language II. Continuation of basic study of the language and culture of the American Deaf community. Prerequisite: ASL 101 in the immediately preceding semester or permission of the instructor. (Fall and Spring)

105. Intermediate American Sign Language I. This course emphasizes further development of receptive and expressive skills. Introduction to linguistic and cultural aspects of ASL, poetry, art, and the theater. Prerequisite: ASL 102 in the immediately preceding semester or permission of the instructor. (Fall and Spring)

106. Intermediate American Sign Language II. Consists of advanced use of expressive and receptive skills in complex grammatical structures, dialogues, and storytelling. Prerequisite: ASL 105 in the immediately preceding semester or permission of the instructor. (Spring)

200. Signed Language Structure. An examination of signed languages and the cognitive constraints that shape them, through a detailed consideration of the structure of American Sign Language and other natural languages of the world. Includes training in sign language notation and analysis. Intermediate sign language skills required. Prerequisite: one of: ASL 105, LIN 210, 220, 226, BCS 152, or permission of the instructor. Same as LIN 230, BCS 264. (Spring)

201. Literature in American Sign Language. Study of selected videotapes and films ranging from the early 1900s to the present. Emphasis is placed on historical background, meanings of the story content, discussion of grammatical features, and styles revealed in these contexts. Prerequisite: ASL 106. (Fall)

202. History and Culture of the Deaf Community. Discussion of various aspects of the American Deaf culture, including descriptions of deafness and the Deaf community. Prerequisite: ASL 105. (Fall)

203. Advanced Sign Language. This advanced language course focuses on advanced ASL grammar, providing students practice in expression and comprehension skills in both conversational and formal registers. Hands-on exercises include the descriptions of complex and abstract concepts and advanced argumentation techniques. Prerequisite: ASL 106 in the immediately preceding semester or permission of the instructor. (Spring)

205. Art of Translation: ASL and English. Introduction to the study of meaning-based translation, with focus on the analysis of ASL texts and the development of written English translations. Prerequisite: ASL 201. (Spring)

208. Language Development. Basic introduction to children’s language development including acquisition of phonology, syntax, and semantics. Focuses on the acquisition of a first language by young children and compares the acquisition of various spoken and signed languages to find possible universal principles of language learning. Students should have a background in at least one of the fields of study pertinent to course material: language structure, psycholinguistics, cognitive science, developmental psychology, or general psychology. No signing skills required. Prerequisite: one of BCS 110, 111, 172, PSY 101, or LIN 110. Same as LIN 208, BCS 259. (Every other Spring)

209. Teaching ASL as a Second Language. Provides ASL teachers with an understanding of how sign language is taught in various settings, and explores current teaching methods and theories. Students are provided opportunities to prepare lesson plans. Prerequisite: ASL 106. (Fall)

210. Narrative and Poetic Styles in ASL. Examines techniques for telling stories and creating poetry in ASL. Students have the opportunity to create literary forms from personal experience, as well as from well-known sources, with guidance from the instructor. Prerequisite: ASL 106. (Spring)

220. Deaf Image in Film, Theater, and Novels. Examination of historical films, plays, and novels that portray deaf individuals. Discussion of various attitudes towards deafness revealed in these creative works. Prerequisite: ASL 201. (Every other Spring)

250. Sociolinguistics of the Deaf Community. Investigation of language attitudes, language policy, language use in society, and discourse analysis. Prerequisite: ASL 105. (Spring)

260. Language and Psycholinguistics. Overview of the nature and processing of human languages; comparisons between language and animal communication systems; consideration of biological bases of human language; discussion of the cognitive mechanisms used in producing, understanding, and learning language. No signing skills required. Prerequisite: BCS 110, 111, 112, or LIN 110. Same as LIN 217, PSY 152, BCS 152. (Fall)

280. Current Trends in Deaf-Related Careers. Bringing together historical information and career preparation strategies for teaching, service provision, and other related fields, this course is designed to provide an understanding of signed language as used in various settings and to explore professional service approaches to the Deaf community. The course also provides an overview of topics ranging from child language development to brain-cognition relationships, from educational interventions to technological advances, and social, psychological, and linguistic characteristics of Deaf communities and sign languages. (Fall)

391. Independent Study of ASL.

ADDITIONAL COURSES

LIN 110. Introduction to Linguistic Analysis. (Spring and Fall)

BCS 162. Understanding Reading. (Fall)

BCS 172. Development of Mind and Brain. (Spring)

BCS 221. Audition. (Spring)

ANTHROPOLOGY

Anthony T. Carter, Ph.D. (Cambridge)  Professor of Anthropology
Robert Foster, Ph.D. (Chicago)  Professor of Anthropology and Mercer Brugler Distinguished Teaching Professor
Thomas P. Gibson, Ph.D. (London School of Economics)  Professor of Anthropology; Chair of the Department
Ayala Emmett, Ph.D. (Rochester)  Associate Professor of Anthropology
Signithia Fordham, Ph.D. (American University)  Associate Professor of Anthropology
Elena Kim, Ph.D. (New York University)  Assistant Professor of Anthropology
Daniel Reichman, Ph.D. (Cornell)  Assistant Professor of Anthropology
Anthropology is the comparative study of humanity. At its broadest, it seeks to understand the origin and diversification of human adaptations to the natural and social environment. Thus physical anthropologists study the evolution of human anatomy and archeologists study the artifacts left behind by human manipulation of the natural world. But the most complex and diverse products of human activity are the languages, social relations, and cultural meanings humans have developed. It is these invisible artifacts that linguistic, cultural, and social anthropologists study. The Department of Anthropology at the University of Rochester specializes in this aspect of humanity: the comparative study of contemporary human cultures and societies.

The Department of Anthropology offers programs of study leading to the B.A. degree and to the B.A. degree with honors. Students may minor in anthropology by following one of the two plans described below.

**CONCENTRATION REQUIREMENTS IN ANTHROPOLOGY**

Ten courses are required for a concentration in anthropology.

- Ten courses in anthropology of which at least eight must be beyond 200. The eight advanced courses must include at least three of the core courses in anthropology: ANT 202, 203, 204, and 205; ANT 291, Research Practicum; ANT 292, Senior Seminar

**THE HONORS PROGRAM**

Students wishing to graduate with honors in anthropology must fulfill the normal requirements of the undergraduate concentration and must in addition:

- Successfully complete one additional core course and one other course beyond the 200 level
- Successfully complete ANT 393, Honors Research in Anthropology
- Submit an acceptable honors thesis by April 1 of the senior year and present the thesis for review by a committee of the department

**REQUIREMENTS FOR MINORS**

**Anthropology**

Six courses in anthropology are required.

- Three of the following courses in anthropology: ANT 202–205, 291

**UPPER-LEVEL WRITING REQUIREMENT**

In addition to fieldwork, writing is central to the practice of social and cultural anthropology. Instructors give particular attention to techniques of analytical and persuasive writing in the four core courses and two research seminars required of all majors. Students are provided opportunities across the anthropology curriculum to write fieldnotes, journals, exegetical essays, original ethnographies, and substantial research papers. Accordingly, the upper-level writing requirement is fulfilled by virtue of completing the requirements for the major in anthropology.

**COURSES OF INSTRUCTION**

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

**INTRODUCTORY COURSES**

101. Cultural Anthropology. The course is designed to give students an understanding of cultural variation and how anthropologists interpret it. (Note: at least one section of this course is open to juniors and seniors each year.)

101Q. Introduction to Cultural Anthropology. The aim of this course is to introduce students to cultural anthropology and to familiarize them with some of the work anthropologists do.

102. Introduction to Medical Anthropology. An exploration of anthropological interpretation, research, and writing on the ways different peoples understand and deal with issues of illness and disease.

103. Women in Society: A Cross-Cultural Perspective. Explorations of women’s domestic, productive, and political roles in both traditional and industrial societies, including the United States.


**TOPICS IN ANTHROPOLOGY**

110. Introduction to Linguistic Analysis. This course investigates the structure of human language, covering the basic techniques and concepts in the subfields of contemporary linguistic analysis. Same as LIN 110.

193. Diversity and Community. Explores themes of cultural diversity, social inequality, and the nature of community in American society to prepare students for work with culturally diverse populations in community service settings.

210. Anthropology and Education. Explores the nature and function of education in complex state systems. What roles do race, class, gender, and ethnicity play in the kind of education America’s children receive?
213. World Musics. Examination of the world’s musical cultures with an emphasis on musical repertories and how they fit within specific social and cultural context. Same as MHS 281.

214. Love, Friendship, and Community. Introduces students to a neurosociological perspective on strong interaction and strong personal ties—high-frequency social dynamics marked by strong mutual coupling. Same as SOC 221.

215. Self, Soul, and Psycho. What does it mean to be an individual? Examination of the shaping of experience in culture.

216. Medical Anthropology. The study of “disease” and “illness” in relation to society and culture. Comparative analysis of bio- and ethno-medical models. Prerequisite: one course from among ANT 101–104.


220. Healing and Ritual. Examination of the symbolic dimensions of healing by looking at the use of ritual procedures as a form of healing.

226. Culture and Consumption. Anthropological approaches to the study of mass consumption and material culture in Western and non-Western societies.

227. Local and Global Market Research. Introduction to the uses of cultural anthropology in a business environment; focusing on the retail experience of business owners and consumers in Rochester communities as well as factors influencing behavior from the wider political economy.

228. Women, Cloth, and Culture. An inquiry into women’s predominant roles as textile artists, particularly in the Americas. Same as AH 259.

243. Ritual and Cosmology: South Pacific Perspectives. Explores the cosmological visions and ritual processes of different South Pacific societies. Topics include myth, magic, sorcery, rites of passage, cargo cults, Christian missionization, and millennial anxieties.

244. Families, Marriage, and Communities in a Global Perspective. Explorations of current issues facing American families as expressions of contemporary change, cultural diversity, ethnic heritage, and core American values.

245. American Culture. American public debates on topics such as politics, religion, education, health, and popular culture are at the center of this course. Anthropology’s cross-cultural research brings a global perspective to our local American debates.

248. Colonial and Contemporary Africa. An exploration of the impact of capitalism on African socioeconomic institutions during and after the era of formal colonialism. Same as HIS 106.

249. Envisioning Shangri La. Examines representations of Tibet and the Himalayas in the West through film, memoir, and ethnography.


252. Women in East Asia. A history of women in the family, women and work, and women in society in three East Asian cultures. Same as HIS 296.

253. Imagining India. An introduction to India through the different perspectives of ethnographies, novels, and autobiographies written by both indigenous South Asian and foreign authors. Same as ANR 230.

262. New Nationalisms. Taking the post-Communist 1990s as a point of departure, this course explores the roots and fates of different varieties of nationalism in Eastern Europe. Same as ANR 251.

263. Religion and Society. An exploration of rituals and doctrines in selected scriptural and nonscriptural religions in relation to their social-historical context. Same as REL 295.

264. Islam and Global Politics. A study of the conflict between Muslim Asia and Christian Europe, from colonial times to contemporary American foreign policy.

265. Religion and Culture: Fundamentalism. Looking deeply into the phenomenon of fundamentalism by concentrating on two prominent fundamentalist movements, Islam and Christianity, growing out of very different social and cultural worlds. Same as ANR 260.

266. Global Culture. This course brings an anthropological awareness of local cultural differences to bear upon the conception of a single capitalist world system, examining social processes that accelerate the circulation of ideas, people, and objects across the globe at unprecedented velocity: mass media, tourism, migration, and so forth.

270. Urban Schools: Race and Gender. Exploring the nature and function of education in complex state systems.

274. Creative Ethnography. Experiment in different styles of telling a cultural story in one of the following ways: fiction, poetry, autobiography, creative nonfiction, photography, play, or the more traditional ethnographic writing.

276. Native American Gender and Representation in Art. An examination of quilt-work, beadwork, pottery, weaving, and other arts, both historical and contemporary made by indigenous women. Same as AH 276.

277. The Museum and “The Other.” An analysis of the history and development of ideas about non-Western peoples as presented in North American museums from 1880 to the present. Same as AH 277.

278. Birth and Death II: Making Populations Healthy. Examination of programs carried out by governments, multilateral organizations, and nongovernmental organizations to deal with “public problems” connected to population.
The Department of Art and Art History offers courses in art history and studio arts, which may lead to a B.A. degree with a concentration in either of these areas. With a curricular plan and ongoing consultation with a departmental advisor, a student may petition for an individualized major that combines both. Each program provides a basis for graduate study and professional training for those students who wish to pursue careers in the arts, and a sound liberal education for those students whose final degree will be the Bachelor of Arts. Students’ programs may be enriched by undergraduate/graduate courses in the department’s graduate program in visual and cultural studies, which are based on the sociohistorical study of visual and literary texts with an emphasis on theory and criticism. The department also offers course clusters and minors in art history and studio arts. Students often complement a major in one area with a minor or cluster in another.

Registration in some courses is strictly limited and is by consent of the instructor. First-year students and sophomores will be considered first for admission to 100-level courses.

In-residence access to streamed media files and other recent technologies are among the many resources for learning available through the Multimedia Center, also located in the library.

The collections of the Memorial Art Gallery and George Eastman House are used in support of the programs of the department. In addition, a series of exhibitions is presented in the Art/Music Library Gallery and in the Hartnett Gallery at Wilson Commons, both on the River Campus. The department regularly sponsors visiting artists of note and lectures by distinguished outside speakers.

The Sage Art Center’s spacious and open studio areas create an interactive surrounding conducive to broad-based learning; they include well-equipped studios for sculpture, painting, photography, drawing, printmaking, and video as well as digital and performance art. Sage is monitored by a studio art manager and a studio art program coordinator. A schedule of supplemental hours, monitored by studio assistants, provides ample opportunity for students to further their independent production in the facility. Faculty studios increase faculty accessibility and the AsIs Gallery presents ongoing and rotating exhibitions of art by students who are currently enrolled in courses in the studio program.

### ART HISTORY AND VISUAL STUDIES

The information and methodologies of many fields come together in the Department of Art and Art History. The discipline of art history involves analysis of the work of art itself—understanding its form, and why and how we make use of it—and also investigation of its historical context and mode of production. These inquiries can lead in many different directions, involving economic, social, and gender issues; problems of patronage and taste; and questions of literary exchange, conservation, and restoration. The studies of visual and cultural documents and objects draw upon adjacent areas such as cultural and intellectual history, psychology, literary criticism, religion, philosophy, sociology, archaeology; and the history of science. The history of art is an ideal field for a student who wishes to acquire a general cultural background, to develop analytical and writing skills, and to sharpen critical sensibilities.

### General Course Information

The introductory courses cover broad historical periods and serve to introduce the methods and problems of art history. They are useful to both first-year and upperclass students who want a general overview. Sophomores, juniors, and seniors, as well as first-year students who have had a course in art history or some other relevant preparation, may begin at the 200 level, as well as the 100 level. The 200-level courses offer similar introductions but in much more defined areas. These are useful cognate courses for those students studying a specific period or culture in another discipline, and are also the building blocks for any major or minor within the department. Seminars are indicated by the 300 level and are open to advanced students from other disciplines as well as to art history majors.

### CONCENTRATION IN ART HISTORY

For those who wish to concentrate in art history, the department offers a variety of approaches, structured around each student’s individual interests and career plans. Students construct their studies with the aid and direction of the program advisor and typically follow one of three areas of concentration:

- **Studio Theory and Practice**
- **Histories and Theories of Art**
- **Visual and Cultural Studies**

These areas respond to the various ways students wish to explore art and visual culture, and provide flexible guidelines that allow students to combine courses from different departments into an individualized major within the Department of Art and Art History.

A total of 12 courses fulfill the requirements for a student majoring in art history/visual culture:

- Two or three 100-level introductory art history courses
- Four 200/400-level art history courses in a relationship determined in discussion with the program advisor
- Independent Study in Art History and Internships can meet some of these requirements.
- One or two studio art courses
- One section of Writing on Art (offered once a year) in advance of the senior year
- One section of Senior Seminar in the senior year
- One additional course in the department

Study abroad during a fall or spring semester in the University’s European Arts Internship program is encouraged for majors and non-majors alike. In Europe, there are opportunities to work in institutions, such as the Victoria and Albert Museum and the Museum of London, and internships can be arranged in Paris, Brussels, Bonn, and Madrid. In addition, the department offers an Art New York semester, which includes an internship and coursework as well as intensive exposure to art history/visual culture and contemporary art-making in New York City’s museums, galleries, studios, and cultural institutions.

### REQUIREMENTS FOR HONORS IN ART HISTORY

Students wishing to be considered candidates for honors in art history/visual culture must meet the following requirements before applying:

- Have a grade-point average of 3.5 within the major.
- Have completed the introductory courses and at least three courses in the students’ program, or have demonstrated proficiency in a number of related courses in the field.
- Have completed a 300-level art history course or have otherwise demonstrated competence in the area of study of the proposed honors project.

To apply, submit to the department an honors project proposal that has been mutually agreed upon (signed) by the students and their chosen faculty advisors early in the junior year.

Following acceptance of the proposal by the department, the candidates must complete the requirements listed below:

- A minimum of 12 credit hours beyond concentration requirements: 4 credits in a 300-level seminar in art history; 4 in AH 393, senior project (the honors course); and 4 in a course given outside the art and art history department (e.g., in the history department) that is related to the honors project. The latter is intended to provide a broader or deeper understanding of the period or area of the honors project and normally will be a 200-level course selected in consultation with the honors faculty advisor and taken in the spring semester of the junior year or fall semester of the senior year.
- Completion of a distinguished essay, approximately 35 pages in length, which may be a seminar paper, further researched and suitably expanded, or it may be the direct product of AH 393 (Senior Project). In addition to the student’s project advisor, a second reader, selected together by the advisor and the student, will evaluate the essay.
- Maintenance of a 3.5 GPA within the major.
- Submission of two complete copies of the essay, one of which will be preserved by the University.
MINOR IN ART HISTORY
The minor consists of five courses, three of which should be interrelated; these may be courses in a historical sequence, deal with a single period or medium, or address theoretical issues:
- Two or three 100-level courses
- Two or three 200/400-level courses

REQUIREMENTS FOR INDEPENDENT STUDY IN ART HISTORY
- Topic for research must not be available within the regular offerings of the department. Schedule conflicts are not a rationale for independent study.
- Faculty director must have relevant expertise in topic area and be willing to supervise the student and to sign a contract stipulating agreed-upon requirements.
- Normally open only to juniors and seniors.
- Semester must result in a completed research paper or equivalent project at an advanced level of achievement.

STUDIO ART
In Studio Art, housed at Sage Art Center, students find a multifaceted program that allows them to choose an area of concentration that is either medium-based or interdisciplinary. Both introductory and advanced-level courses operate within a regulated student/faculty ratio, enabling the personalized one-to-one interaction that is vital in art instruction. Students can select courses in drawing, painting, photography, sculpture, installation, video and sound art, digital imaging, performance art, and multimedia.

Introductory level courses focus on skill building, while providing students with a common vocabulary and artistic concepts needed to communicate ideas. Introductory courses usually explore interdisciplinary approaches within a particular medium, thereby expanding a student’s scope of possibilities and providing him or her with alternative perspectives.

The advanced-level courses explore a wide array of approaches to artistic production while paying particular attention to individualized modes of investigation and learning within the creative arts. They foster an in-depth understanding of contemporary frameworks of art making and the critical discourses that address them. Advanced levels of studio courses are generally grouped together to promote peer-supported learning experiences. Students in levels “B” and “C” are expected to take on more challenging problems, both conceptually and technically. Individual work, progress, and effort are evaluated at respective levels. Many advanced-level courses include a seminar component that addresses issues in cultural and critical theory, as well as art history. In addition, the sophomore/junior seminar (Writing on Art) and the Senior Studio and Seminar (both required of studio majors) focus primarily on these concerns. Thematically structured courses are also offered. In these courses a particular area of investigation becomes a locus for discussion and artistic production in a variety of materials and formats.

CONCENTRATION IN STUDIO ART
A concentration in studio art must be declared prior to the junior year and requires a total of 12 courses, including two from a related area:
- Four 100-level studio art courses (prior to the junior year). No more than two transferred studio courses will be accepted toward a major.
- Three 200/300-level studio art courses
- One section of Writing on Art (offered once a year) in advance of the junior year
- Two semesters of Senior Studio and Seminar (taken in the final two semesters, the second of which should not be taken concurrently with any other 200/300-level studio).
- Two other courses from related areas. Although these two courses are typically in art history/visual culture, one being from offerings in critical theory, relevant courses in film and media studies will also be accepted.

Students are encouraged to meet with a faculty advisor to design a coherent program of study early in their degree process. Majors should consider courses alternative to the regular 200/300-level offerings; internships, both local and through the Art New York program, as well as courses such as Supervised Teaching and study abroad are encouraged and available. The major is required to have an exhibition, installation, or screening of work in the final semester of the senior year; documentation of the work must be submitted and the student must be prepared to discuss the work in depth in a final review with the studio art faculty.

REQUIREMENTS FOR HONORS IN STUDIO ART
A student wishing to be considered a candidate for honors in studio art must meet the following requirements before applying:
- A grade-point average of 3.3 within the concentration.
- Completion of the established minimum distribution requirement for the concentration.

To apply, submit to the department an honors project proposal, the subject of which has been mutually agreed upon (signed) by the student and his or her chosen faculty advisor early in the junior year.

Following the acceptance of the proposal by the department, the candidate must fulfill the following requirements:
- A minimum of 12 credit hours beyond concentration requirements having the following distribution: 4 credit hours in a 200-level studio course; 4 credit hours in a 200-level or higher art history course, preferably in critical theory or an offering relevant to the student’s artistic concerns, and agreed upon in consultation with a studio advisor; 4 credit hours in senior project (SA 393).

The work involved in SA 393 should include both studio work and a distinguished essay of 8 to 15 pages soundly substantiating the student’s art with historical and/or theoretical principles. SA 393 should be completed during the senior year and must be evaluated by the chosen faculty advisor and a second reader selected by mutual agreement.
- Submission of two complete copies of the essay and photographic documentation, one of which will be preserved by the University.

MINOR IN STUDIO ART
A minor in studio art requires five production-based courses:
- Two or three 100-level studio art courses
- Two or three 200/300-level studio art courses

Students are encouraged to meet with faculty advisors to design a coherent program of study early in their degree process.

REQUIREMENTS FOR INDEPENDENT STUDY IN STUDIO ART
- Topic for exploration must not be available within the regular offerings of the department.
- Faculty director must have relevant expertise in topic area and be willing to supervise the student and to sign a contract stipulating agreed-upon requirements.
- Normally open only to juniors and seniors who have previously completed a sufficient number of studio courses.
- Semester must result in a body of work toward a major.

Course schedule conflicts are not accepted as a rationale for independent studies.

REQUIREMENTS FOR GRADUATION WITH DISTINCTION IN THE DEPARTMENT OF ART AND ART HISTORY
Grade-point average is calculated only from the required concentration courses. Transfer grades and study abroad grades (unless given by the University of Rochester) are not computed. Levels of distinction are rated by minimum GPA as follows:
- With Distinction 3.3
- With High Distinction 3.5
- With Highest Distinction 3.7

UPPER-LEVEL WRITING REQUIREMENT
Upper-level writing requirements for the department are available in the department office or by contacting one of the department undergraduate advisors.
COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

ART HISTORY (AH)

INTRODUCTORY COURSES

100. Introduction to Visual and Cultural Studies. An understanding of how visual media informs our everyday lives and experiences.

101. Introduction to Art History. Addresses visual culture from the Renaissance to the present and seeks out connections and themes within the whole period under consideration.

102. Introduction to Media Studies. Considers the cultural and economic histories of the mass media, with television produced in the United States as the primary focus with close consideration to questions of race, gender, and cultural identity in U.S. media culture. Same as ENG 131.

106. Introduction to Archaeology. Introduces the discipline and methods of archaeology. Deals with the history of archaeology in Europe and the Near East from the work of the antiquarians to the projects of the late twentieth century.

128. Modern Art. An introduction to major modernist movements of nineteenth- and twentieth-century art, such as Impressionism, Post-Impressionism, Cubism, Surrealism, Modernism, and Postmodernism.

231. Introduction to Traditional Japanese Culture. Traces the development of the Japanese cultural tradition through the prominent examples of its visual, literary, and performing arts. Same as JPN 210.

234. Culture of Urban Japan 1650–1850. Evolving urban spaces of Edo (modern Tokyo) created a stage for new and vibrant forms of theater, dance, music, song, literature, and art, many of which remain vital today. These activities are examined in light of the development of new modes of material culture and sophisticated commercial practices that gave rise to new modes of artistic expression. Same as JPN 220.

238. Romanesque Europe. A study of the origins, development, and regional manifestations of western European art and architecture of the Romanesque period (eleventh and twelfth centuries A.D.).

239. Gothic Europe. Explores the intellectual, social, political, economic, and religious aspects of medieval culture of the twelfth and thirteenth centuries through its art and architecture.

240. British Art of the Middle Ages. A survey of art of the middle ages in England from the end of Roman occupation to the Tudor period.

242. Barbarian Europe. Explores the cultures of northern Europe from the fifth century B.C.E. to the tenth century C.E.

250. Art and Culture. This course addresses the painting, sculpture, and architecture of seventeenth-century Europe and considers the art of the period as a manifestation of a post-Renaissance sensibility. The art examined ranges from Italian ecclesiastical sculpture through to French royal architecture and Dutch still-life painting.

255. American Art. Examines selected topics in American art and culture of the nineteenth and twentieth centuries. A central concern will be the way in which images, especially paintings and photographs, gave shape to the ideas of what America was and what it meant to be American, as well as to the creation of an urban culture.


259. Women, Cloth, and Culture. An inquiry into women’s predominant roles as textile artists, particularly in the Americas. Topics may include historical quilts and other needlework; contemporary fiber arts; indigenous and ethnic traditions; and theoretical and feminist issues concerning women’s roles as makers of “soft goods.”

262. Impressionism and Post-Impressionism. Deals with the interconnected artistic concerns and subjects of artists such as Manet, Monet, Renoir, Pissarro, Morisot, Cassatt, Cezanne, Van Gogh, and Gauguin. Also investigates ways in which paintings and prints made during the nineteenth century in France in their representations of aspects of modern life such as the city and suburbs, leisure activities, and gender roles participated in communicating a particular world view.

263. Twentieth-Century Art and Culture. Explores selected aspects of twentieth-century art, including issues of identity, difference, and the body and ways in which institutions have shaped art.

266. African-American Visual Culture. This course surveys African-American visual culture (including painting, sculpture, photography, prints, textiles, mixed media, installations, performance, and video) in the United States from Colonial times to the present.

274. Cultural History of American Architecture. Focuses on what the critic Andreas Huyssen calls the perceived “Great Divide” between highbrow and lowbrow forms of culture. Explores the emergence of these divisions and interrogates if and how they have blurred in the recent past.


277. The Museum and the Other. An analysis of the history and development of ideas about non-Western peoples as presented in North American museums from 1880 to the present.

280. Native American Art and Religion. Case studies in Native American cultures where the visual arts articulate religious and philosophical systems of thought.

282. Topics in Contemporary Art and Criticism. Examines specific practices of art and architecture from the 1960s through the 1990s in relation to theories of postmodernism.

287. Culture on Display. Most of us experience “real art” in museums. This course looks at the phenomenon of the museum, asking questions about the relation of culture and institutions.

292. The Modern City. An interdisciplinary approach to examining the modern city in both moments of triumph and crisis. Using critical theory, urban planning documents, as well as fictional accounts, students explore
competing ideological perspectives on and debates over the place of the city in modern culture.

ADVANCED COURSES

306. *The Sublime in Visual Culture.* Undertakes a re-evaluation of the perceived ideas associated with the operation of the pictorial sublime in European Romanticism and to extend its traditional boundaries to encompass Colonial, American, and Orientalist painting.

307. *Rhetoric of the Frame: the Borders and Boundaries of Art.* At first glance the frame of art may seem to be as unproblematic as it is marginal—a surround to protect the edges of a painting, a pedestal for a statue, an embellishment or ornament for what is already present—this course aims to show that the frame serves to create a space for the artwork that the work, in itself, is incapable of furnishing.

308. *Art and Imitation: Visual Representation in the Western Tradition.* Addresses the issue of imitation in art, focusing on the binary between the imitation of nature and that of the antique.

310. *Representing Differences.* Takes up current debates on identity by examining cultural constructions of differences and by approaching differences in their complex interrelations. A wide range of cultural practices is studied, from Hollywood movies to postmodern art.

320. *The Politics of Space.* Explores how space is constructed and politiziced. Close attention is paid to questions of identity formation, particularly as they relate to issues of gender, race, and class.

350. *Topics in Contemporary Art and Criticism.* The focus changes from monographic (Andy Warhol) to a survey of postmodernism or art of the 1960s.

362. *Seminar in Western Monasticism.* Explores the variety of forms of monasticism in Western Europe during the Middle Ages.

368. *Art of the Colonial Encounter.* Case studies in artistic production forged in the “middle ground” of a colonial situation, particularly in the Americas, from 1520 to the present.

391. *Independent Study in Art History.* Independent study under faculty guidance of a limited field of art history or individual study on a single topic at an advanced level under the guidance of a member of the art history faculty.

392. *Art New York Program.* The program combines an internship with a colloquium and elective courses and is run each spring semester in New York City. It is offered to all qualified junior and senior students interested in learning about how art gets made, how it reaches its public, and the processes of its interpretation and display. Students receive a total of 16 credits for their Art New York semester.


STUDIO ART (*SA*)

INTRODUCTORY COURSES

111. *Introductory Drawing.* Explores basic principles of visual organization and investigates, at an elementary level, approaches to art production.

112. *Concepts in Introductory Drawing.* Addresses studio production as a visual component of the investigations into the exhibition institution, while taking up the readings and formal concerns relevant to the topic.

121. *Introductory Painting.* Emphasizes direct experience, practical processes, and compositional basics all in a framework of critical analysis.

122. *Concepts in Introductory Painting: Ritual and Practice.* Provides direct experience with painting and related processes at an introductory level while supplying a forum for examining how ritual and practice play into the creation of art.

131. *Introductory 3D.* Explores many approaches to three-dimensional art making, within a contemporary framework, and covers a wide range of materials and processes from metal and welding to assemblage, from wood to experimental methods and media.

132. *Concepts in Introductory 3D: (Re)Collecting the Object.* Provides a framework for introductory-level, three-dimensional studio production focusing on the incorporation of appropriated objects and found materials.

141. *Introductory Photography.* The goal of this course is to begin to formulate conceptual ideas and to gain the skills and techniques necessary to synthesize these ideas through photographic imagery.

142. *Concepts in Introductory Photography: Materials and Processes.* Introduces students to black-and-white photographic processes. Learned skills and the linear and nonlinear representation of ideas are addressed as well as nonsilver photographic processes.

144. *Introductory Photography/Digital.*


151. *Introductory Digital Art.* An introduction to the use of the computer as a tool of art production using various multimedia software.


161. *Introductory Video and Sound Art.* Video and sound are considered as independent art forms, as well as part of video installations and sound installations. This course covers both analogue and digital formats.

162. *Concepts in Introductory Video and Sound Art.*

171. *Introductory 2D.* Provides a framework for two-dimensional studio production; conventional experimental approaches and processes of drawing, painting, and photography; or drawing, collage, and digital image production are investigated, utilized, and interrelated.

172. *Concepts in Introductory 2D.*

190. *Introductory Visual Production.* Builds on areas of research interest connected to AH 100, Introduction to Visual and Cultural Studies. Addresses studio production as a visual component of these investigations, while taking up relevant readings and formal concerns.

191. *Visual Display: The Exhibition as Artistic Medium.* Introduces students to traditional and nontraditional artistic production and curatorial practice as emphasized by current exhibitions at institutions within the Rochester area.

PROGRAM COURSES

It is recommended that two 100-level studio courses and one course in art history be taken prior to or concurrently with a 200-level course.

In courses numbered 200 and higher, some research may be assigned; however, students are expected to develop their own projects. Individual and group discussions of student work, gallery visits, presentations by guest artists, slide talks, and readings are regular features of these courses. Classes are normally limited to 15 students.

222A, B, C. *Advanced Painting.* The evolving continuation of painting with serious emphasis on independent proposals, research, and production. The broadest examination of painting and related media is expected.


233A, B, C. *Issues in Advanced 3D: Narrative and Anti-Narrative.* Broadens the investigation undertaken in introductory 3D classes to include other materials and processes as well as a focus on working in an interdisciplinary fashion.

242A, B, C. *Advanced Photography.* Looks at contemporary photography and photographic practice using readings, visiting collections, galleries, and production of photographic work.

243A, B, C. *Issues in Advanced Photography: Race, Gender, Ethnicity.* Examines the relationship between digital and traditional photographic processes and the ideas of contemporary race and gender theory.

244A, B, C. *Advanced Photography/Digital.*

245A, B, C. *Issues in Advanced Photography/Digital: Image and Text.* Image and text serve as a conceptual background for exploring advanced photographic and digital techniques. The course begins with basic photographic skills and moves into areas such as silkscreening, alternative photographic processes, and Adobe Illustrator.
ASIAN STUDIES

COMMITTEE ON ASIAN STUDIES
Douglas R. Brooks, Ph.D. (Harvard) Professor of Religion and Chair of the Committee Anthony T. Carter, Ph.D. (Cambridge) Professor of Anthropology
Thomas P. Gibson, Ph.D. (London School of Economics) Professor of Anthropology

William B. Hauser, Ph.D. (Yale) Professor of History
David Pollack, Ph.D. (California, Berkeley) Professor of Japanese and of Chinese
Joanne Bernardi, Ph.D. (Columbia) Associate Professor of Japanese

The program uses teaching assistants in large lecture courses and language offerings.

ASIAN STUDIES CERTIFICATE PROGRAM
The Asian Studies Certificate Program at the University of Rochester is designed to permit students concentrating in the social sciences and humanities to develop knowledge of Asian cultures and languages as a complement to their disciplinary concentration. Those interested in the program must satisfy the requirements in their major field and, in addition, submit a program that includes at least the following:

• Six courses from those listed under the heading “Primary Courses in Asian Studies,” with an understanding that no more than two will be taken in any one department.
• Four additional courses from those listed under the heading of Modern Languages and Cultures (Chinese or Japanese), Religion and Classics (Sanskrit), or Allied Asian Courses. In addition:
  • None of the courses used toward the certificate may be taken satisfactory-fail.
  • Students must earn an overall grade-point average of at least 2.0 in courses submitted for the program.

The Asian Studies Certificate Program is administered through the College Center for Academic Support. Students who plan to enroll in the program should pick up an application at the Academic Services Counter outside 312 Lattimore Hall and then consult one of the members of the Asian Studies Committee, who act as faculty advisors for the program. Once the application is filled out and is signed by the faculty advisor, it should be returned to the Academic Center for Academic Support.

Upon graduation, students successfully completing the Asian Studies Program receive a Certificate in Asian Studies.

PRIMARY COURSES IN ASIAN STUDIES
Definitive course listings are published before each semester. Courses listed here carry a 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

ANTHROPOLOGY
ANT 253. Imagining India.
ANT 264. Islam and Global Politics.

MODERN LANGUAGES AND CULTURES—Japanese and Chinese
Any offering between JPN 210 and JPN 293.

CHI 210. Introduction to Traditional Chinese Culture.

HISTORY
HIS 105. Traditional Japan.
HIS 108. Traditional China.
HIS 183. Modern China.
HIS 184. Modern Japan.
HIS 238. History of British India.
HIS 296. Women in East Asia.
HIS 314W. Gender and International Human Rights.
HIS 347. Tokugawa Japan, 1560–1850.
HIS 349. Postwar Japan.
HIS 387W. Nation and Culture in Twentieth-Century China.
HIS 388W. The Chinese Cultural Revolution in History and Memory.
HIS 389W. Gender in Late Imperial and Modern China.

RELIGION AND CLASSICS
REL 105. The Asian Search for Self.
REL 106. From Confucius to Zen.
REL 171. Storytelling in Indian Religions.
REL 172. Striving for Perfection.
REL 173. Religions of Japan.
REL 255. Hindu Goddesses and Women.
REL 257. Hindu Philosophy I.
REL 258. Hindu Philosophy II.
REL 259. Hindu Mystical Poetry.
REL 260. Hindu Ascetics, Mystics, and Doctors.
REL 261. Hindu Tantric Yoga.
REL 263. Japanese Noh Drama.
REL 266. Buddhist Philosophers, Poets, & Siddhas.
REL 270. Medicine, Alchemy & Religion in India.
REL 271. Medieval Hindu Philosophy.
REL 272. Classical Yoga Traditions of India.
REL 310. Seminar in Mahabharata.

MODERN LANGUAGES AND CULTURE, RELIGION AND CLASSICS (LANGUAGES)
Any offering from Modern Languages and Cultures (Chinese and Japanese) or Religion and Classics (Sanskrit)

ALLIED ASIAN COURSES
ANTHROPOLOGY
ANT 266. Global Culture.

HISTORY
HIS 201. The Third World.
PLANNING A CURRICULUM

One particular advantage of the program is that the student need not make a premature choice between the degrees offered. The B.A. and B.S. degrees require a common core of courses: BIO 110 and 111/111L or BIO 112 and 113/113L, Principles of Biology I and II or Perspectives of Biology I and II; and BIO 198, Principles of Genetics. These core courses are to be taken in sequence. The student may then sample several gateway courses in the specific areas of the six B.S. curricula; these courses may be used as part of a B.S. program (as required or as diversification courses) or may become part of a B.A. curriculum. In addition, most of the courses required in the allied fields (chemistry, mathematics, and physics) are the same for both of the degrees offered. Students interested in pursuing a concentration in biological sciences are urged to begin fulfilling the chemistry requirements in the first year. A typical program for the first two years that would prepare a student for a B.A. degree is listed below. Students seeking a B.S. degree would take the same first-year sequence of courses, but the coursework taken in the second year might differ somewhat.

First Year

Fall
BIO 110 or 112
CHM 131
MTH 141/161, or 161Q
English

Spring
BIO 111/111L or 113L
BCH 132
MTH 142, 162, or 162Q
Elective

Second Year

Fall
BIO 198 and 198L
CHM 203/207 lab
CHM 171Q/173Q lab
Elective

Spring
BIO 250
CHM 204/208 lab
CHM 172Q/210 lab
Elective

B.A. in Biology

The B.A. curriculum is intended to provide the student with a well-rounded introduction to the major areas of biology. This program offers the maximum freedom of course selection since among the 8 biology courses (minimum 32 credits) necessary to earn the degree, only the 3 core courses are specifically required. Students must also satisfy a laboratory requirement. (See page 33.)

B.S. in Biological Sciences

The B.S. curricula stress theoretical and experimental approaches and the development of expertise in a focused field of biology, including analysis of results in the current scientific literature. Breadth of background in biology is achieved through the three biology introductory courses, three to six advanced courses, and one to two additional biology diversification courses (depending on the concentration) selected from outside the area of specialization. To earn a B.S. degree, a total of 40 to 47 credits of coursework in the biological sciences is required.

B.S. in Biological Sciences: Biochemistry

Studies include basic concepts of metabolism, protein structure and function, and experimental techniques. In the senior year a wide variety of optional courses is offered allowing specialization in enzymology, membrane biochemistry, DNA, and RNA structure and function. (See page 32.)

B.S. in Biological Sciences: Cell and Developmental Biology

Studies include the analysis of the structure and function of cells, the organization and interaction of cells and tissues, and the processes of development responsible for cell and tissue differentiation and production of the adult form. Emphasis is placed on the molecular bases for cellular and developmental processes. (See page 34.)

B.S. in Biological Sciences: Evolutionary Biology and Ecology

Studies include evolution, ecology, animal behavior, population genetics, ecological genetics, and molecular evolution. The major emphasis in all courses is on the dynamic processes influencing organisms and populations in nature. The subject matter presented concentrates on integrating comparative, experimental, and theoretical methods to study evolutionary and ecological processes. An emphasis in this program is the integration of behavioral, ecological, molecular, and genetic methods to investigate ecological and evolutionary questions. (See page 34.)

B.S. in Biological Sciences: Microbiology

The introductory course considers how microorganisms are adapted to their environment. In advanced courses, emphasis is placed on the molecular functioning of microorganisms, covering such topics as microbial physiology, microbial genetics, industrial microbiology, immunology, virology, and pathogenic microbiology. (See page 37.)

B.S. in Biological Sciences: Molecular Genetics

Studies include chromosome structure, the molecular mechanisms of DNA replication, DNA mutations and repair, DNA recombination, and the regulation of gene expression. Emphasis is placed on experimental approaches, including recombinant DNA technology. (See page 35.)

B.S. in Biological Sciences: Neuroscience

Neuroscience, which is an interdisciplinary pursuit, deals with the mechanics by which nervous systems mediate behavior. A combination of coursework and laboratory experience gives students a firm understanding of brain function from the molecular to the behavioral levels. Topics covered include biochemical, anatomical, physiological, and medical aspects of neurobiology. (See page 38.)
ADVANCED PLACEMENT
Students with an AP biology score of 4 or 5 receive 4 general elective credits but not credit towards the biology major or minor. Students retain these general elective credits regardless of the biology courses they take.

CERTIFICATE IN BIOTECHNOLOGY
The program for the Certificate in Biotechnology is designed to give students the specialized background needed for entry into biotechnology jobs or for advanced study in the field. Requirements for the certificate complement the B.A. or B.S. tracks in biological science; students in other degree programs may also be eligible. The certificate is administered through the Undergraduate Program in Biology and Medicine Office. Interested students should contact this office for further information.

The Certificate in Biotechnology will be awarded upon graduation to those who have successfully completed the following requirements:

Biology Courses—three (12 credits) with associated labs: BIO 110 or 112; 111 or 113; 198; and BIO/BCH 250

Computer Technology Courses—one (4 credits): CSC 170, 171, ECE 114 or an approved equivalent

Microbiology Courses—one (4 credits): MBI 220 or MBI 431 (offered every other year); Laboratory Experience—two (8 credits): one from group A and one from group B

Group A: MBI 221W or BIO 268
Group B: BIO 228, BCH 208, MBI 221W, or BIO 268

For more information, please visit the UPBM Web site at www.rochester.edu/College/BIO/UPBM.

INDEPENDENT RESEARCH, DEGREES WITH DISTINCTION, AND COURSE OFFERINGS
The facts, theories, and principles taught in our formal courses ultimately derive from research in the laboratory or the field. Students are encouraged to experience the challenges, successes, frustrations, and excitement of research by arranging independent research in the laboratories of individual members of the faculty in the Undergraduate Program in Biology and Medicine and faculty in various departments in the nearby University of Rochester School of Medicine and Dentistry. The diversity of the faculty’s research interests gives students the opportunity to select projects from a wide variety of fields. Work in a laboratory provides an inside view of science and scientists that cannot be gained through lectures or reading and is particularly valuable for undergraduates who contemplate careers in research. Occasionally students’ contributions to research are incorporated into published journal articles, and the students are listed as coauthors of these papers.

Independent research may be arranged for formal course credit (courses numbered 395). These courses are generally taken in the junior or senior year after the student has gained a solid background of courses in the biological sciences and the allied fields. Each year 50 to 60 students take independent research courses with faculty members in the program. Research projects can also be conducted during the summer through de Kiewiet Summer Research Fellowships, awarded on a competitive basis to students in program tracks.

Students who have demonstrated ability and initiative in an independent research project may be recommended for a degree with distinction in research after successful completion and defense of a written dissertation. The deadline for applying for a degree with distinction in research is February 28 of the senior year. However, it is necessary to plan the research project well beforehand. Specific information is available from the Undergraduate Program in Biology and Medicine Office (402F Hutchison Hall).

UPPER-LEVEL WRITING REQUIREMENT
Majors in all of the biology department’s areas of concentration must complete either two upper-level writing requirements in their major or one in their major and one in another natural science. When students declare their major, they are advised of the possible ways to meet the requirement. For more information, please visit the UPBM Web site at www.rochester.edu/College/BIO/UPBM.

BIOCHEMISTRY AND BIOPHYSICS
Robert A. Bambara, Ph.D. (Cornell) Professor of Oncology in Biochemistry and Biophysics and of Microbiology and Immunology; Chair of the Department
William A. Bernard, Ph.D. (Penn State) Professor of Biochemistry and Biophysics
Philip J. Fay, Ph.D. (Rochester) Professor of Biochemistry and Biophysics
Thomas E. Gunter, Ph.D. (California, Berkeley) Professor of Biochemistry and Biophysics
Jeffrey J. Hayes, Ph.D. (Johns Hopkins) Professor of Biochemistry and Biophysics and of Oncology in the Cancer Center
Russell Hill, Ph.D. (Rutgers) Professor of Biochemistry and Biophysics and of Oncology in the Cancer Center
Hartmut Land, Ph.D. (Heidelberg) Professor of Biochemistry and Biophysics; Director of Center for Cancer Biology
Mahin D. Maines, Ph.D. (Missouri) Professor of Biochemistry and Biophysics and of Environmental Medicine, and Dean’s Professor of Toxicology in the Dean’s Office
Lynn E. Maquat, Ph.D. (Wisconsin-Madison) Professor of Biochemistry and Biophysics

REQUIREMENTS FOR BIOCHEMISTRY
• Introductory Courses—Three (12 credits). BIO 110 or 112; 111/111L or 113/113L; and BIO 198/198L
• Laboratory Experience—One and a half labs (5 credits). BCH 208 and one from the following: BIO 111L, 113L, 198L, or 151.
• Required Biochemistry Core Courses—Six (24 credits). BCH 250, BIO 202, IND 408, 410, and two courses from the following: BCH 412, BIO 243, CHM 252, 437, IND 409, 447, MBI 473, or BCH 395 (only one semester of BCH 395 is allowed to count in the track requirements).
• Elective/Diversification—One course from outside the biochemistry curriculum. It is to be selected from those courses offered through the Undergraduate Program in Biology and Medicine and approved by the track coordinator.
• Allied Fields—Nine courses (36 credits)
  1. Two semesters of calculus.
  2. Four semesters of chemistry (two general and two organic courses) with labs.
  3. Two semesters of calculus-based physics with labs.
  4. One additional approved course in math, statistics, or computer science.
COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

208. Biochemistry Laboratory. A laboratory course designed to introduce students to the theory and practice of biochemical, molecular, and structural biology techniques. Students gain first-hand experience with state-of-the-art techniques and data analysis through their participation in experiments that emphasize particular assays, methods, or instrumention. Computational analysis of macromolecular structure and DNA sequence database searches and alignments are integral components of the students’ experience. Topics covered are agarose gel and SDS polyacrylamide gel electrophoresis; computer-assisted protein structure analysis, DNA sequence database searching, and DNA sequence alignment; laboratory safety; DNA isolation; expression of recombinant proteins, fractionation and purification of proteins; affinity chromatography; ion exchange chromatography, measurements of volume and mass and calculation of concentration; polymerase chain reaction, DNA restriction fragment analysis; cloning and manual and automated DNA sequencing; protein crystallization; protein structure assessment; setting up enzyme reactions and measuring kinetic parameters; spectrophotometry and western blotting. (Spring)

250/BCH 250. Biochemistry. Covers fundamental aspects of biochemistry, including bioenergetics, protein structure, kinetic analysis of enzyme action, and general intermediary metabolism. The text is the 4th edition of Lehninger’s Principles of Biochemistry by Nelson and Cox, with its accompanying Web site, which includes access to CHIME tutorials that explore structure-function relationships in biomolecules. Three 50-minute lectures plus 10 two-hour workshops. Prerequisites: BIO 110 or 112, plus CHM 203 and 204 (may be taken concurrently), or permission of instructor. (Spring and Summer)

305. Independent Research in Biochemistry. Arrangements for independent research in biochemistry can be made with any faculty member in the biochemistry track. Contact can be made directly with the appropriate faculty member or through the Committee for the B.S. Track in Biochemistry. Students may take this course up to two times with a particular faculty member. BCH 395 courses may be used to fulfill some of the requirements for distinction in research, provided that prior approval of the track coordinator is obtained.

408. Biochemistry. This course is designed primarily for graduate students. Eighty-minute lectures cover selected topics in modern biochemistry including analysis of protein and domain structure by classical and modern methods. Includes mass spectrometry, NMR, X-ray crystallography, and other biophysical techniques; protein-ligand and protein-protein interactions; enzyme kinetics and catalytic mechanisms; DNA and RNA structure and function; cellular energy production and utilization; and glycobiochemistry. In addition to lectures, workshops are held once a week, during which time selected papers from the literature are discussed (BCH 250/450). Prerequisite: a one-semester introductory course in biochemistry or equivalent. (Fall)

410. Molecular Biology and Genetics. This course is designed primarily for graduate students. One-hour lectures cover modern topics of interest, including DNA replication; DNA repair and mutagenesis; regulation of RNA transcription in eukaryotes; RNA processing, and protein translation. Emphasis is placed on both biochemical and genetic approaches to the study of these problems. Special additional topics include genomics as an approach to regulation and mammalian genetic techniques of analysis. (Spring)

412. Advanced Topics in Biological Macromolecules. An advanced biochemistry lecture course intended for senior undergraduate and graduate students. Topics include DNA structure, RNA structure and catalysis, nucleic acid-protein interactions, X-ray crystallography, NMR spectroscopy, protein folding, molecular chaperones, membrane proteins, post-translational modifications of proteins, ATPases, G protein and function, protein-protein interactions, proteases and clotting. Presentation of a journal article in a workshop. Preparation of a paper based on a topic in the course. Prerequisite: IND 408. (Spring)

The following is a typical program:

First Year

Fall

CHM 131
MTH 141, 161, 161Q, or 171Q
BIO 110 or 112
Elective

Spring

CHM 132
MTH 142, 162, 162Q, or 172Q
BIO 111/111L or 113/113L
Elective (CAS writing one semester)

Second Year

CHM 203 & 207 lab or
CHM 171Q & 173Q lab
BIO 196/198L
Elective

Spring

CHM 204 & 208 lab or
CHM 172Q & 210 lab
BIO/BCH 208
Elective

BIO 196
Elective

Third Year

PHY 113 or 121
BIO 202
BIO elective
IND 408

Fourth Year

IND 408
Advanced Biochemistry
Elective
Elective

Further information is available from the Biochemistry Track Coordinator, Box 712, University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, New York 14642-8607.

BIOLG

Thomas Eickbush, Ph.D. (Johns Hopkins) Professor of Biology; Chair of the Department
David S. Goldfarb, Ph.D. (California, Davis) Professor of Biology
John Jaenike, Ph.D. (Princeton) Professor of Biology
Joanna B. Olmsted, Ph.D. (Yale) Professor of Biology; Dean of Arts and Sciences
H. Allen Orr, Ph.D. (Harvard) Professor of Biology and Adjunct Professor of Biochemistry and Biophysics
John H. Wilken, Ph.D. (Utah) Professor of Biology
Cheeptip Benyajati, Ph.D. (Princeton) Associate Professor of Biology
Xin Bi, Ph.D. (Johns Hopkins) Associate Professor of Biology
 Gloria M. Culver, Ph.D. (University of Rochester) Associate Professor of Biology
 James D. Fry, Ph.D. (Michigan) Associate Professor of Biology
 Rulang Jiang, Ph.D. (Wesleyan University) Associate Professor of Biomedical Genetics in the Center for Oral Biology, of Dentistry and of Biology
 Elaine Sia, Ph.D. (Columbia) Associate Professor of Biology
 Michael Welte, Ph.D. (University of Chicago) Associate Professor of Biology
 Richard Glor, Ph.D. (Washington University) Assistant Professor of Biology
 Vera Gorbonova, Ph.D. (Weizmann Institute of Science) Assistant Professor of Biology
 Heinrich Jasper, Ph.D. (Heidelberg) Assistant Professor of Biology
 J. David Lambert, Ph.D. (Arizona) Assistant Professor of Biology
 Rita K. Miller, Ph.D. (Northwestern) Assistant Professor of Biology
 Robert Minckley, Ph.D. (Kansas) Adjunct Assistant Professor of Biology
 Daven Presgraves, Ph.D. (Rochester) Assistant Professor of Biology
 Justin M. Ramsey, Ph.D. (University of Washington) Assistant Professor of Biology
 Andrei Seluanov, Ph.D. (Weizmann Institute of Science) Assistant Professor (Research) of Biology
 Alan Dietsche, Ph.D. (Kentucky) Senior Lecturer in Biology
 Anthony J. Olek, Ph.D. (SUNY, Albany) Senior Lecturer in Biology
 S. Linx Sajdak, Ph.D. (Wisconsin, Milwaukee) Senior Lecturer in Biology
 Thomas T. Bannister, Ph.D. (Illinois) Professor Emeritus of Biology
 Martin A. Gorovoy, Ph.D. (Chicago) Rush Rhees Professor Emeritus of Biology
Biology and Medicine is described on page 31.)

The Department of Biology administers curricula leading to four of the seven undergraduate concentrations offered through the Undergraduate Program in Biology and Medicine: (1) B.A. in biology, (2) B.S. in biological sciences: cell and developmental biology, (3) B.S. in biological sciences: molecular genetics, and (4) B.S. in biological sciences: evolutionary biology and ecology. A minor in biology is also available. (The general structure of the Undergraduate Program in Biology and Medicine is described on page 31.)

PLANNING A CURRICULUM

See Undergraduate Program in Biology and Medicine, page 31, or visit UPBM Web site: www.rochester.edu/College/BIO/UPBM.

B.A. IN BIOLOGY

The requirements for the B.A. in biology are

- Introductory Courses—Three (12 credits). BIO 110 or 112, BIO 111/111L or 113/113L, and BIO 198/198L.
- Laboratory Experience—One and one-half laboratories. Any combination of laboratories listed below will satisfy the laboratory requirement. Most students complete BIO 111L, 113L, and 198L concurrently with the lecture course and then choose a third laboratory that complements an interest. Half labs (meet once a week) are BIO 111L, 113L, and 198L, 203, 204, 204, EES 271. Full labs (meet twice a week) are BIO 228, 268, BCH 208, MBI 221, NSC 203, BIO 395.
- Elective/Diversification—Three courses (12 credits.) These courses are to be selected from any of those offered through the Undergraduate Program in Biology and Medicine, including approved Independent Research 395. Biology elective courses must be 200-level or higher. For lists of UPBM elective/diversification courses please visit the UPBM Web site at www.rochester.edu/College/BIO/UPBM.
- Allied Fields—Eight courses with indicated laboratories
  1. Two semesters of general chemistry with lab.
  2. One semester of organic chemistry with lab.
  3. One semester of general physics with lab.
  4. Two semesters of calculus.
  5. Two additional approved courses in math, statistics, computer science, chemistry, or physics.

B.S. IN BIOLOGICAL SCIENCES: CELL AND DEVELOPMENTAL BIOLOGY

Cell biology is the study of the structure, composition, and function of cells and their component parts. Cell biologists seek to elucidate the common features of different kinds of cells as well as the unique aspects of structure and physiology that confer special functions on different types of cells in a tissue, organ, or organism. The fields of cell biology and developmental biology are closely related. Developmental biology deals with the processes involved in the production of an adult organism from a fertilized egg. A major facet of developmental biology is the study of the mechanisms by which differentiated cells achieve and maintain their special properties. Modern investigations in both cell and developmental biology are extensively integrated with the theories, results, and techniques of genetics, molecular biology, and biochemistry. The requirements for the B.S. in cell and developmental biology are

- Introductory Courses—Three (12 credits). BIO 110 or 112, BIO 111 or 113, and BIO 198/198L.
- Laboratory Experience—One and one-half labs (6 credits total). BIO 228. Strongly recommended half labs (1 credit) are BIO 111L or 113L, and 198L.
- Required Cell and Developmental Biology Core Courses—Five courses (20 credits). BIO 210, 226, 250, and two courses to be chosen from the following list or from courses approved by the track coordinator: BIO 220, 243, IND 447, BIO 215, MBI 473.
- Elective/Diversification Courses—One (4 credits). To be selected from those courses offered through the Undergraduate Program in Biology and Medicine and approved by the track coordinator. Visit the UPBM Web site for course offerings: www.rochester.edu/College/BIO/UPBM/upbmcourses.htm.
- Recommended Elective Courses—BIO 516, Seminar in Cell and Development (a 1-credit, non-required course open to concentrators with permission of the instructor); and IND 395, Independent Research (this does not count as an elective/diversification course).

- Allied Fields—Nine courses (36 credits)
  1. Two semesters of calculus.
  2. Four semesters of chemistry (two general and two organic courses) with lab.
  3. Two semesters of calculus-based physics (PHY 113, 114 or PHY 121, 122) with lab.
  4. One additional approved course in math, statistics, or computer science.

B.S. IN BIOLOGICAL SCIENCES: ECOLOGY AND EVOLUTIONARY BIOLOGY

This track encompasses the studies of behavior, ecology, population genetics, evolution and biodiversity. Together these disciplines attempt to understand how the processes of adaptation affect the activities of individuals, local breeding and foraging groups, and larger populations by natural selection, as well as by other forces that shape the genetic and phenotypic character of populations and species. The sheer number of the mechanisms underlying population phenomena and especially evolutionary change, as well as the numbers of individuals and genes involved and the great variety of different kinds of ecological interactions possible, predispose the subject to formulation in mathematical models that must be tested through observation of natural populations. Students in this program are encouraged to gain experience with the use of analytical, sampling, and experimental techniques of laboratory and field biology.

The requirements for the B.S. in evolutionary biology and ecology are

- Introductory Courses—Three (12 credits). BIO 110 or 112, 111 or 113; and 198.
- Laboratory Experience—Three (6 credits). BIO 111L, 198L, and 395 (4 credits) or a 4-credit laboratory course approved by the track coordinator.
- Required Ecology and Evolutionary Biology Core Courses—Four (16 credits). BIO 205 and 263, plus two of the following: BIO 232, 260, 265, or EES 201.
- Elective/Diversification—Two (8 credits) To be selected from courses offered through the Undergraduate Program in Biology and Medicine and approved by the track coordinator. Courses listed above as Ecology and Evolutionary Biology core courses may not be used to fulfill the elective/diversification requirement.
- Allied Fields—Nine courses (36 credits)
  1. Two semesters of calculus.
  2. Two semesters of general chemistry with lab.
  3. One semester of organic chemistry with.
  4. One semester of calculus-based physics with lab.
  5. One semester of statistics.
  6. Two additional approved math, statistics, computer science, physics, or chemistry courses.

NOTE: CSC 108 and 110 are not acceptable.
B.S. IN BIOLOGICAL SCIENCES: MOLECULAR GENETICS

Molecular genetics is the study of the structure of genes and the mechanisms involved in their maintenance, alteration (mutation), expression, replication, recombination, and transmission. Molecular geneticists seek to describe these events in terms of the properties and interactions of DNA, RNA, proteins, and other molecules.

The requirements for the B.S. in molecular genetics are

- **Introductory Courses**—Three (12 credits). BIO 110 or 112; 111 or 113, and 198.
- **Laboratory Experience**—One and a half laboratories. BIO 268 (4 credits) plus one other full or half laboratory. It is recommended that students take BIO 111L and 198L as part of the introductory courses to complete the requirement. Please visit the UPBM Web site for the full list of laboratories: www.rochester.edu/College/BIO/UPBM/upblmcourses.htm.
- **Molecular Genetics Core Courses**—Five (20 credits). BIO 250, 202, 243, and two courses to be chosen from the following list or from courses approved by the track coordinator: BIO 215, 210, 222, 226, IND 410.
- **Elective/Diversification**—One course (4 credits). This course must be from outside the molecular genetics curriculum. It is to be selected from those courses offered through the Undergraduate Program in Biology and Medicine and must be approved by the track coordinator. Visit the UPBM Web site for course offerings: www.rochester.edu/College/BIO/UPBM/ubpmcourses.htm.
- **Allied Fields**—Nine courses (36 credits)
  1. Two calculus courses.
  2. Four semesters of chemistry (two general and two organic courses) with lab.
  3. Two semesters of calculus-based physics.
  4. One additional approved course in math, statistics, or computer science.

MINOR IN BIOLOGY

The requirements for a minor in biology are

- **Introductory Courses**—Three (14 credits). BIO 110 or 112; 111 or 113; and 111L or 113L, or 198 or 198L.
- **Advanced Courses**—Two (minimum 8 credits). These courses are to be selected from any of those offered through the Undergraduate Program in Biology and Medicine and approved by the program director. Please visit UPBM Web site for course offerings: www.rochester.edu/College/BIO/UPBM/ubpmcourses.htm.
- **Laboratory Requirement**—One lab or one lab equivalent (two half labs). BIO 111L, 113L, 151, and 198L are half labs as they are included in the courses.
- **Allied Fields**
  - Two courses of chemistry with labs.

No independent study or research course (391 or 395) may be counted toward the minor in biology. The biology department undergraduates advisor grants approval of courses chosen for the minor.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

102. Biology and the Environment. A non-majors course which explores evolutionary and ecological topics such as the evolution of disease, origin of species, the distribution of life on earth, biological and economic importance of ecosystems, factors affecting climate, the recycling of resources within natural systems, the relationships of species within ecosystems and how they benefit the health of natural communities. Special topics dealing with issues of conservation and human activity are addressed. Three 50-minute lectures and one 50-minute recitation per week. (Fall)

104. Ecosystem Conservation and Human Society. As the natural resources on which human society depends are depleted, the need for sound conservation policies increases. The course examines a new approach in conservation biology that identifies and places economic value on the services that natural ecosystems provide. Such services are basic to sustainable societies and include clean water and air; waste decomposition, pollination, and farmland productivity. Major themes the course covers include an overview of other approaches in conservation biology, a review of the services that ecosystems provide, ways the value of these services are determined, and how this novel approach is influencing economic and political policy at local, national, and international levels. (Fall)

110. Principles of Biology I. The first semester in a yearlong course sequence designed for majors and minors in biology. Major topics include biochemistry, molecular and cellular evolution, cell reproduction, fundamentals of genetics, and molecular biology. Prerequisites: Completion or concurrent enrollment in CHM 131 or equivalent. Three 50-minute lectures and one two-hour problem-based workshop per week. (Fall)

111. Principles of Biology II. The second semester of the introductory sequence designed for majors in biology. Topics include evolution (natural selection, speciation, plant and animal diversity), ecology (population genetics, ecosystem structure, species interactions), plant and animal physiology. Prerequisites: BIO 110 and completion or concurrent enrollment in CHM 132. Three one-hour exams and a comprehensive final exam. (Spring)

111L. Introductory Biology Laboratory. This is the lab course that accompanies the lecture course Principles of Biology II. The content of the course is drawn from the lecture material. Topics include plant and animal diversity, anatomical dissections, and methods in bacteriology, animal behavior, and basic physiology. An emphasis is placed on problem solving, critical thinking, and experimental design. Prerequisites: BIO 110 or 112 and concurrent enrollment in BIO 111. (Spring)

112. Biology Perspectives I. The first semester of a two-course introductory sequence for students with a strong background in science. Topics include biochemistry, molecular and cellular evolution, cell reproduction, fundamentals of genetics, and molecular biology. This course differs from BIO 110 in that there is greater emphasis on experimental approaches, data analysis, and quantitative methods, and may include reading original papers. A significant writing component includes preparation of a book review (from selected titles, such as The Selfish Gene). Note, both BIO 110 and 112 are designed to prepare students who intend to major in biology. Prerequisites: Students with a score of 4 or 5 on the AP Biology test, particularly those who have interest in research, and completion or concurrent enrollment in CHM 131 or equivalent. (Fall)

113. Biology Perspectives II. Second semester of a two-course introductory sequence for students with a strong background and interest in science. Topics include evolution, organismal diversity, ecology, and functional biology. This course differs from BIO 111 in that there is greater emphasis on experimental approaches, data analysis, and quantitative methods, and includes reading original papers. Note, both BIO 110 and 112 are designed to prepare students who intend to major in biology. Prerequisites: BIO 112 or AP Biology score of 4 or 5 and concurrent enrollment in CHM 132. (Spring)

113L. Perspectives in Biology Lab. This is the laboratory course that accompanies the lecture course Perspectives in Biology II. Course content is drawn from the lecture material and includes biological diversity, ecology, evolution, animal behavior, physiology, and bioinformatics. Emphasis is placed on problem solving, critical thinking, and experimental design and data analysis. Lab meets for one three-and-a-half-hour session each week. Prerequisites: BIO 110 or 112 and concurrent enrollment in BIO 113. (Spring)

151L. Introduction to Biochemistry Lab. The course is designed to introduce sophomore biology majors to experimental approaches in biochemistry, including enzyme assays, protein analysis, and the use of antibodies. Students develop light microscopic skills, e.g., using fluorescent dyes in organelle isolation. The laboratory emphasizes experimental design and data analysis and complements BIO 250, Biochemistry. This course can be used to satisfy a half laboratory requirement in the B.A. and other UPBM tracks. Prerequisites: One year of introductory biology and chemistry (e.g., BIO 110 and 111, CHM 131 and 132). Genetics (e.g., BIO 198) recommended. (Spring)

198. Principles of Genetics. Methods of genetic analysis are stressed. Topics include Mendelian assortment; gene interaction; link-
age and mapping; methods of genetic analysis in yeast, bacteria, and phage; DNA replication, recombination, repair, and mutation; gene expression and its regulation; transposons and retroviruses; recombinant DNA technologies; cancer as a genetic disease. Three 50-minute lectures and one 50-minute problem-based recitation per week. Prerequisites: BIO 110 and completion or concurrent enrollment in CHM 203 or 205. (Fall and Summer)

**198L. Principles of Genetics Lab.** This course is an introduction to basic genetic theory and laboratory practices. Topics covered are classical inheritance in eukaryotes, bacterial genetics, and molecular technology techniques. One three-and-a-half-hour laboratory per week. Prerequisite: concurrent with BIO 198 or after completion of BIO 198. (Fall)

**201. Lectures in Physiology.** Function of various mammalian systems with special emphasis on humans. Topics include excitable tissue, respiration, nutrition, reproduction, endocrinology, skeletal, circulatory, and renal systems; homeostatic mechanism. Students attend lectures and take examinations with students in BIO 204, Mammalian Physiology, and attend one hour of mandatory recitation per week. Laboratory exercises are not conducted. Three 50-minute lectures and one 50-minute recitation per week. Prerequisites: BIO 110 and 111 or permission of the instructor. (Spring)

**202. Molecular Biology.** This course deals with the molecular mechanisms of gene replication, gene expression, and the control of gene expression in both prokaryotic and eukaryotic cells. Topics include enzymatic mechanisms of DNA replication, recombination and repair, transposable elements; DNA transcription; RNA splicing; RNA translation; repressors, activators, and attenuators; recombinant DNA and genetic engineering. Two 75-minute lectures and one 75-minute recitation per week. Prerequisites: BIO 198 and BIO 250 strongly recommended; should have completed biology core as well as chemistry requirements. (Fall)

**203. Mammalian Anatomy.** This course deals with the structural and systematic anatomy of animals with special emphasis on human beings. Laboratory includes the dissection of fresh and preserved tissue plus analysis of systems and structures. Three 50-minute lectures and one three-hour laboratory per week. Prerequisites: BIO 110 and 111 or permission of instructor

**204. Mammalian Physiology.** Function of various mammalian systems with special emphasis on humans. Topics include excitable tissue; respiration; nutrition; reproduction; endocrinology; skeletal, circulatory, and renal systems; homeostatic mechanisms. Three 50-minute lectures and one three-hour laboratory per week. Three 50-minute lectures and one three-hour laboratory per week. (Spring)

**205. Evolution.** Fundamentals of evolution. Topics include natural selection and its ecological basis, population genetics including selection and drift, speciation, and molecular evolution including the neutral theory, molecular phylogeny, and the molecular clock. Two 75-minute lectures and one 50-minute recitation per week. Prerequisites: BIO 111 and 198. (Fall)

**210. Molecular Cell Biology.** An intermediate-level course that covers fundamental cell processes at the molecular level. Topics include organelle structure and functions, membrane biogenesis, cytoskeleton, cell signaling, cell cycle growth and death. Prerequisites: BIO 110 and 111 and BIO 198 and 250 are strongly suggested. (Fall)

**215. Molecular Biology of Cell Signaling.** This course offers an introduction to cell signaling. The course explores basic molecular mechanisms of signal transduction, and studies how these mechanisms are used in different contexts to direct cell fate during development, physiology, and disease. The course draws heavily on experiments from the classical and most recent primary literature. Two 75-minute lectures and one 50-minute recitation per week. Prerequisites: BIO 198. One of the following: BIO 202, 250 strongly recommended. (Spring)

**220. Advanced Cell Biology: Cytoplasmic Structures and Functions.** This course focuses on the cell biology of processes occurring within the cytoplasm of the cell. Topics include protein trafficking, cytoskeleton, cell adhesion, the cell cycle, and processes of cell transformation. This literature-based course focuses on the experimental strategies used in modern cell biology to investigate important questions in these areas. Two 75-minute lectures and an optional 50-minute recitation per week. Prerequisite: BIO 198 strongly recommended. (Spring)

**222. Biology of Aging.** This course focuses on molecular mechanisms of aging and its relation to DNA damage and repair. Evolution of aging, model organisms used in aging research, human progeroid syndromes, and interventions to slow aging are discussed. Two 75-minute lectures and one 50-minute recitation per week. Prerequisites: BIO 198. BIO 202 recommended. (Fall)

**226. Developmental Biology.** This course deals with the cellular and molecular aspects of animal development, with emphasis on processes and underlying mechanisms. Topics include fertilization, cloning (of embryos), embryonic cleavage, gastrulation, early development of model vertebrates and invertebrates, patterning of cell fates along embryonic axes of Drosophila and vertebrates, organogenesis, sex determination, and stem cells. Two 75-minute lectures per week and a 50-minute recitation per week. Prerequisite: BIO 198 or permission of the instructor. (Fall)

**228. Laboratory in Cell and Developmental Biology.** This course is designed to provide (1) training in specific methods used in molecular, cell, and developmental biology research, with emphasis on data acquisition and analysis; (2) experience in the design and execution of experiments, writing scientific reports, and public scientific presentation. Two four-hour labs and one 50-minute recitation per week. Prerequisites: BIO 250 strongly recommended; should have completed biology core as well as chemistry requirement. (Fall)

**232. Genetic Diversity and Human Disease.** Examines genetic diversity in human populations from an evolutionary perspective, with particular attention to inherited diseases and disease-related traits. Covers single gene disorders, chromosome abnormalities, and diseases with complex inheritance. Emphasis is on using evolutionary and genetic principles to understand why inherited diseases persist, rather than on clinical details of particular diseases. Other topics include the use of genetic information to reconstruct human migrations and human evolution. About one-third of the course grade will be based on group projects in which students research practical issues in human genetics and present their findings to the class. Three 50-minute lectures and one 50-minute recitation per week. Prerequisite: BIO 198. (Spring)

**243. Eukaryotic Gene Regulation.** This course examines mechanisms of transcription initiation, eukaryotic chromosome structure and its modifications, mechanisms of chromatin-mediated regulation of gene expression, as well as epigenetics and functional genomics. Lectures and readings draw heavily on primary literature both classic and most recent. Two 75-minute lectures and a one-hour recitation per week. Prerequisites: BIO 198, 202, and 250; 150 strongly recommended. (Spring)

**247. Environmental Animal Physiology.** This course is designed for sophomore biology majors who want to deepen their understanding of animal function by examining how animals cope with environmental challenges. This includes cellular and physiological adaptations to extremes of temperature, salinity, and altitude. This course can be used to satisfy an upper-level elective/diversity requirement in all UPBM tracks and as a “group” A requirement in the B.A. track. Prerequisites: one year of introductory biology and chemistry (e.g., BIO 110 and 111, CHM 131 and 132). Genetics (e.g., BIO 198) recommended. (Spring)

**250. Introduction to Biochemistry.** Covers fundamental aspects of biochemistry, including bioenergetics, protein structure, kinetic analysis of enzyme action, and general intermediary metabolism. The text used is the 4th edition of Lehninger’s Principles of Biochemistry by Nelson and Cox, with its accompanying Web site, which includes access to CHIME tutorials that explore structure-function relationships in biomolecules. Three 50-minute lectures plus 10 two-hour workshops. Prerequisites: BIO 110 or 112, plus CHM 203 and 204 (may be taken concurrently) or permission of instructor. (Spring and Summer)

**260. Animal Behavior.** Examines animal behavior from an ecological and evolutionary perspective. Topics include social organization, mating systems, foraging, aggression,
and animal learning. Students also learn quantitative techniques in behavioral biology. Three 50-minute lectures and one 50-minute recitation per week. Prerequisite: BIO 111. (Fall)

263. Ecology. A survey of adaptations to the physical environment, dynamics of natural populations, interactions between species, and human impact on the environment. Three 50-minute lectures and one 50-minute recitation per week. Three 50-minute exams and a comprehensive final exam. Prerequisites: BIO 111 and MTH 142 or 161. (Fall)

265. Molecular Evolution. This course explores evolution at the molecular level. Basic evolutionary principles are used to infer history from DNA sequences; to determine what forces have shaped the evolution of genes and genomes; to understand the relationship between molecular evolution and phenotypic evolution; and to address applied problems, like assigning biological function to genome sequences, finding the sources of epidemics, and finding the genes involved in human disease. Prerequisites: BIO 111, 198, 205. (Spring)

268. Laboratory in Molecular Genetics. A series of experiments, each lasting two to three weeks, introducing various organisms and techniques. Emphasizes (1) data acquisition and analysis and (2) experience in the design and execution of experiments, writing scientific papers, and public scientific presentation. Two four-hour labs and one one-hour recitation per week. Prerequisite: BIO 202 or permission of instructor. (Spring)

391. Independent Study. A special program of reading in advanced aspects of biological science may be arranged with a faculty member of the department according to the interests of individual students. (Fall and Spring)

395. Independent Research. A special program of laboratory or field work in advanced aspects of biological science may be arranged with a faculty member of the department according to the interests of individual students. (Fall and Spring)

Other biology courses with numbers of 400 and above, although intended primarily for graduate students, are open to qualified juniors and seniors by permission of the instructor. See Official Bulletin: Graduate Studies.

MICROBIOLOGY AND IMMUNOLOGY
Nicholas Crispe, Ph.D. (London) Professor of Microbiology and Immunology
Stephen Dewhurst, Ph.D. (Nebraska) Professor of Microbiology and Immunology
John G. Frelinger, Ph.D. (California Institute of Technology) Professor of Oncology in Microbiology and Immunology
Barbara H. Iglewski, Ph.D. (Pennsylvania State) Professor of Microbiology and Immunology, Chair of the Department

Edith Lord, Ph.D. (California, San Diego) Professor of Oncology in Microbiology and Immunology
Jack Maniloff, Ph.D. (Yale) Professor of Microbiology and Immunology and of Biochemistry
Robert E. Marquis, Ph.D. (Michigan) Professor of Microbiology and Immunology
Marilyn A. Menegus, Ph.D. (Cornell) Professor of Microbiology and Immunology, of Pathology, and of Pediatrics
Tim R. Mosmann, Ph.D. (British Columbia) Professor of Microbiology and Immunology
Richard Barth, Ph.D. (SUNY, Buffalo) Associate Professor of Microbiology and Immunology
J. Scott Butler, Ph.D. (Illinois, Urbana) Associate Professor of Microbiology and Immunology
Virginia Clark, Ph.D. (Rochester) Associate Professor of Microbiology and Immunology
Deborah Powell, Ph.D. (Oxford) Associate Professor of Microbiology and Immunology
Constantine G. Haidaris, Ph.D. (Cincinnati) Associate Professor of Microbiology and Immunology
Dwight J. Hardy, Ph.D. (Louisiana) Associate Professor of Microbiology and Immunology
Baek Kim, Ph.D. (Arizona) Associate Professor of Microbiology and Immunology
Sanjay Maggirwar, Ph.D. (India) Associate Professor of Microbiology and Immunology
Martin S. Pavelka, Jr., Ph.D. (Rochester) Associate Professor of Microbiology and Immunology
Robert G. Quivey, Jr., Ph.D. (Texas) Associate Professor of Microbiology and Immunology
David Topham, Ph.D. (Vermont) Associate Professor of Microbiology and Immunology
Mary Anne Courtney, Ph.D. (Louisville) Assistant Professor of Microbiology and Immunology
Michelle Dziejman, Ph.D. (Pennsylvania) Assistant Professor of Microbiology and Immunology
Wolfgang Haas, Ph.D. (Albany) Assistant Professor of Microbiology and Immunology

All members of the faculty may serve as preceptors of MBI 395. The Department of Microbiology and Immunology annually has up to 10 teaching assistants serving as laboratory instructors in introductory courses.

Microbiology, the study of microorganisms, encompasses bacteriology, virology, mycology, and parasitology and is inseparable from molecular biology, genetics, physiology, and immunology. Consequently, the Bachelor of Science degree program in microbiology integrates coursework in many disciplines in order to provide undergraduates with basic knowledge of the field. This program uses the resources of the Department of Microbiology and Immunology of the School of Medicine and Dentistry and the Clinical Microbiology Laboratories of Strong Memorial Hospital to provide undergraduates with a background in general and medical microbiology.

Students earning the B.S. in biological sciences: microbiology will possess a strong foundation in the basic introductory sciences (chemistry, biology, biochemistry), related areas (mathematics and physics), microbiology, and liberal arts. They will be well prepared to continue graduate education in microbiology, another biological science area, or a health care profession.

MICROBIOLOGY CONCENTRATION
Students should declare the concentration toward the end of their sophomore year. During the junior and senior years, advisors from the Department of Microbiology and Immunology will supervise a concentrator’s progress. Microbiology is one of the B.S. tracks in the Undergraduate Program in Biology and Medicine. With satisfactory performance and completion of degree requirements, students will be recommended for the degree of B.S. in biological sciences: microbiology.

REQUIREMENTS FOR CONCENTRATION IN MICROBIOLOGY
Students concentrating in microbiology are advised to complete the following courses, all of which are requirements for the microbiology B.S. track.

• Introductory Courses—Three (12 credits). BIO 110 or 112; 111/111L or 113/113L; and 198/198L, or an approved alternate.

• Required Microbiology Core Courses—Six (24 credits). MBI 220, 221W lab (recommended to be taken in the junior year), BCH/BIO250, and three courses to be chosen from the following list: MBI 414, 421, 431, 456, 473.

• Elective/Diversification—One course not in the microbiology curriculum. It is to be selected from those courses offered through the Undergraduate Program in Biology and Medicine and approved by the track coordinator. Please visit the UPBM Web site for list of course offerings: www.rochester.edu/College/BIO/UPBM/courses.htm. It may be another laboratory course (see below).

• Supplemental or Laboratory Course—one additional laboratory course (4 credits). It may be a full laboratory course in a biological science (may also satisfy the elective/diversification requirement); two half-laboratory courses; or an approved XXX 395W Independent Research, which does not count as an elective/diversification course.

• Allied Fields

  1. Two semesters of calculus.

  2. Four semesters of chemistry (two general and two organic courses) with lab.

  3. Two semesters of calculus-based physics (PHY 113, 114 or PHY 121, 122) with lab.

  4. One additional approved course in math, statistics, or computer science.
COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

220. An Introduction to Microbiology. This course provides an introduction to bacteria and viruses. Major topics discussed are bacterial and viral structure; microbial metabolism, genetics, growth, evolution, diversity, and ecology; and microbial interactions with humans, including nonspecific and specific (immune) host defenses and mechanisms of microbial pathogenesis. Three lectures per week with assigned readings from text. Prerequisites: BIO 110 or 112; 111 or 113; 198; CHM 203 or equivalent. (Fall)

221W. Microbiology Laboratory. This course is designed to accompany MBI 220. It allows the students to have direct experience in handling microorganisms and studying their properties. Emphasis is placed on learning basic laboratory skills and techniques; collecting and recording data; and analyzing experimental results. Some exercises are performed by individual students, while others are carried out in small groups. Each student completes a semester-length project. Lab notebook and independent project reported in paper and presented in poster. Prerequisite: MBI 220 concurrent or previous. (Fall)

395W. Undergraduate Research in Microbiology. For qualified and interested students, research experience in the laboratories of department faculty members may be arranged. Arrangements need to be made well in advance by contacting appropriate faculty members. (Fall and Spring)

The following graduate courses are open to advanced undergraduates with permission of the instructor.

414. Mechanisms of Microbial Pathogenesis. An examination of host-parasite interactions and the mechanisms by which microbes evade the host response and cause disease. The emphasis is on an understanding of basic laboratory skills and techniques; collecting and recording data; and analyzing experimental results. Some exercises are performed by individual students, while others are carried out in small groups. Each student completes a semester-length project. Lab notebook and independent project reported in paper and presented in poster. Prerequisite: MBI 220 concurrent or previous. (Fall)

411. Microbial Genetics. This course provides an in-depth examination of representative genetic systems in bacteria and bacterial viruses. Emphasis is placed on the methods of genetic analysis used to study biological function. The material covered includes the nature of bacterial variation, processes affecting gene synthesis and integrity, the nature of gene transfer in bacteria, and the regulation of gene expression in prokaryotes. (Graduate students must register for MBI 521, Seminar.) Prerequisite: MBI 220. (Spring)

431. Microbial Physiology. This course provides a survey of microbial physiology with emphasis on metabolism, regulation, cell walls, membranes, ecology, and adaptation to extreme environments. The class meets twice per week for two lectures of 75 minutes each. Extensive handout materials are provided, and readings are from the current literature. (Doctoral students must register for MBI 531, Seminar.) (Fall, every other year)

456. General Virology. Provides an introduction to animal virology, with emphasis on human disease. Topics covered include the following: general properties of viruses, methods in viral research, virus structure, biochemistry of virus replication, virus-host cell interactions, pathogenesis, HIV/AIDS, emerging infections, vaccines, antivirals, and viral vectors and gene therapy. Prerequisites: Basic Biochemistry or Molecular Biology. (Spring, every other year)

473. Immunology. Innate and adaptive immunity; structure and genetics of immunoglobulins and T cell receptors; lymphocyte development, immune regulation, immunological diseases, tumor immunity. Prerequisites: BCH/BIO 250 and BIO 198 or equivalent. BIO 202 is also recommended. (Fall)

NEUROSCIENCE

COMMITTEE ON NEUROSCIENCE

James R. Ison, Ph.D. (Michigan) Professor of Brain and Cognitive Sciences, of Psychology, and of Neurobiology and Anatomy
Carol K. Kellogg, Ph.D. (Rochester) Professor of Brain and Cognitive Sciences and of Psychology
Ernest J. Nordeen, Ph.D. (California, Irvine) Professor of Brain and Cognitive Sciences, of Psychology, and of Neurobiology and Anatomy
Kathy W. Nordeen, Ph.D. (California, Irvine) Professor of Brain and Cognitive Sciences, of Psychology, and of Neurobiology and Anatomy
William E. O’Neill, Ph.D. (SUNY, Stony Brook) Associate Professor of Neurobiology and Anatomy and of Brain and Cognitive Sciences
Alexandre Pouget, Ph.D. (California, San Diego) Associate Professor of Brain and Cognitive Sciences and in the Center for Visual Science

REQUIREMENTS FOR THE B.S. IN BIOLOGICAL SCIENCES: NEUROSCIENCE

• Introductory Courses—Three (14 credits). BIO 110 or 112, 111 or 113 and 111L, and either 198, 250, or 210 (juniors and seniors only). The laboratory section associated with 198 is optional for the neuroscience concentration but is highly recommended.
• Required Neuroscience Core Courses—Five and three fourths (23 credits). NSC 201 and 201L, 203 (it is recommended that this course be taken before the senior year), either 301 or 302, and three electives chosen from the following list; at least one from Group A—NSC 243, 249, 512,* IND 447*—at least one course from Group B—NSC 221, 245. The third elective may be from Group A, B, or C—NSC 242, 246, 508,* BCS 547.
• Elective/Diversification—Two courses (8 credits). These courses must be from outside the neuroscience curriculum and are to be selected from those courses offered through the Undergraduate Program in Biology and Medicine and must be approved by a neuroscience advisor.
• Allied Fields
  1. Four semesters of chemistry (two general and two organic courses) with lab.
  2. Two calculus courses.
  3. Two semesters of calculus-based physics (PHY 113, 114 or PHY 121, 122) with lab.
  4. BCS 200 and 200L (Statistical Analysis and Experimental Design with lab). Must be taken before enrolling in NSC 203. STT 212 plus BCS 200L may be taken in place of BCS 200, however this is not recommended.

*Recommended for seniors only and requires permission of instructor.
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### COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings. For fuller descriptions and up-to-date schedules see the program’s Web page, www.bcs.rochester.edu/neuro/.

#### 201. Basic Neurobiology.
- **Explores fundamental concepts of neural organization and function.** Covers gross and cellular neuroanatomy, neuronal cell biology, the electrophysiology of neurons and synapses, neurochemistry, spinal circuitry, sensory and motor systems, and higher functions including learning and memory. Includes labs on gross anatomy of the brain and computer simulation of neuronal electrophysiology. Prerequisites: BIO 110 or 112 and 111 or 113 and 111L. (Fall)

#### 201L. Basic Neurobiology Lab.
- **Credit—1 hour.** Designed to be taken concurrently with NSC 201, Basic Neurobiology. Seven laboratory sessions reinforce concepts introduced in NSC 201. Each session lasts approximately two hours. NSC 201L is a prerequisite for the upper-level neurobiology laboratory course, NSC 203. (Fall)

#### 203. Laboratory in Neurobiology.
- **Introduces the various methods used in neurobiological research.** Covers anatomical, chemical, behavioral, and physiological approaches to studying neural organization and function and concludes with a research project that extends over a period of five weeks. Prerequisites: BCS 200 and NSC 201 and 201L. (Spring)

#### 221. Audition.
- **An examination of the physiological substrate responsible for hearing.** Topics include the physical stimulus for hearing, receptive aspects of speech and language, overview of peripheral physiology (the outer and middle ears, cochlea, and auditory nerve), and central aspects of auditory physiology (brainstem nuclei, auditory cortex, descending systems). Introduces the electro-physiological techniques used to study auditory function, and explores sensory and perceptual correlates of physiology and sensorineural hearing loss. Prerequisite: BCS 110 or NSC 201 or equivalent background. (Spring)

- **This course introduces students to the field of clinical neuropsychology, which bridges the domains of neurology, neuroscience, and clinical psychology.** It begins with a general overview and history of clinical neuropsychology. Then, principles of neuropsychological assessment and the interpretation of cognitive and behavioral findings as they relate directly to brain dysfunction are discussed. The remainder of the course is “syndrome” oriented and focuses on specific neurological syndromes including: neurodegenerative disorders, cerebrovascular disorders, memory disorders, epilepsy, head trauma, toxic disorders, infectious processes, pediatric neuropsychology, psychiatric syndromes, and forensic neuropsychology. Prerequisite: BCS 110 or BCS 240 (NSC 201) or permission of the instructor. (Spring)

- **An introduction to the field of neuropsychology with an emphasis on cellular and molecular neurochemistry.** Topics range from study of neurochemical mechanisms that underlie normal neural function to discussion of behavioral disturbances that result from neurochemical abnormalities. Considers specific functional issues such as neurochemical mechanisms of adaptive behavior, learning and memory, behavioral disorders, gender differences, and drug-seeking behavior. Prerequisite: NSC 201; an introductory knowledge of biochemistry is recommended. (Fall)

#### 244. Neuroethology.
- **Explores the neural basis of naturally occurring animal behaviors.** Emphasizes how information is integrated from interactions between molecules, cells, and groups of cells, all of which are necessary to produce behavior. Considers how hormones, neural development, anatomy, physiology, and evolution lead to behaviors such as orientation, communication, feeding, and reproduction. Prerequisite: BCS 240 (NSC 201) or permission of instructor. (Spring)

#### 245. Sensory and Motor Neuroscience.
- **Provides an overview of the neural basis of perception and action, covering vision, audition, somatosensation, chemical senses, eye movements, and reaching.** Topics include a review of sensory transduction, how the brain extracts information from sensory signals, how muscles convert nerve impulses into mechanical forces, how different movements are encoded in the brain, and how an animal’s internal state (e.g., memory or attention) influences the course of action. Prerequisite: NSC 201, or equivalent background with instructor’s permission. (Spring)

### Biology of Mental Disorders.
- **Examines the neurobiology of anxiety/phobic conditions, mood disorders, and chronic psychotic states, particularly schizophrenia.** Considers definitions of psychiatric syndromes, the problems of diagnosis, brain organization, and neurotransmitter systems involved in “state” functions. Introduces research approaches including epidemiologic, phenomenologic, family/adoption, longitudinal descriptive, psychophysiological, neuropharmacologic; genetic linkage, and postmortem studies; emphasizes recent in vivo brain imaging and neuroreceptor studies. Prerequisite: BCS 110 or NSC 201 or permission of the instructor. (Fall)

### 249. Developmental Neurobiology.
- **Advanced treatment of the development of the nervous system, including the nature/nurture issue and factors that influence the development of neural organization and function.** Topics include the production, migration, differentiation, and survival of neurons; functional specialization of neural regions; axonal navigation; target mapping. Compares and contrasts developmental plasticity with forms of neural plasticity exhibited in adults. Prerequisite: NSC 201 or equivalent background. (Spring)

#### 301/302. Senior Seminar in Neuroscience.
- **To be taken for one semester in the senior year.** Emphasizes “neuroscience as a scientific career.” Students read and lead discussions of issues of general professional concern: peer review and the evaluation of research, the function of federal research agencies, science education and teaching, and scientific ethics, for example. As a group, students prepare for and attend at least three colloquia in neuroscience. In addition, students prepare three brief reviews of current research problems for class presentation, discussion, and critique. (Fall, Spring)

Undergraduates who wish to enroll in graduate-level neuroscience courses must be declared concentrators in their senior year and have consulted their faculty advisor as well as the course instructor(s) for permission.

Further information on the undergraduate program as well as the 4-1 B.S./M.S. program is available from the Undergraduate Neuroscience Program office, 102 Meliora Hall, and from Professor Ernie Nordeen, Neuroscience Track Coordinator, in the Department of Brain and Cognitive Sciences, 116 Meliora Hall. Also consult our Web page at www.bcs.rochester.edu/neuro.
BRAIN AND COGNITIVE SCIENCES

James F. Allen, Ph.D. (Toronto)  John H. Desauter Professor of Computer Science and Professor of Brain and Cognitive Sciences and of Linguistics
Richard N. Aslin, Ph.D. (Minnesota)  William R. Kenan Professor; Professor of Brain and Cognitive Sciences, of Psychology, and in the Center for Visual Science; Director, Rochester Center for Brain Imaging
Dana Ballard, Ph.D. (California, Irvine)  Professor of Computer Science, of Brain and Cognitive Sciences, and in the Center for Visual Science
Gregory N. Carlson, Ph.D. (Massachusetts)  Professor of Linguistics, of Brain and Cognitive Sciences, and of Philosophy
Robert M. Chapman, Ph.D. (Brown)  Professor of Brain and Cognitive Sciences, of Psychology, and in the Center for Visual Science
Gregory DeAngelis, Ph.D. (California, Berkeley)  Professor of Brain and Cognitive Sciences, of Biomedical Engineering, of Neurobiology and Anatomy, and in the Center for Visual Science
Charles J. Duffy, Ph.D. (Johns Hopkins)  Professor of Neurology, of Neurobiology and Anatomy, of Ophthalmology, of Brain and Cognitive Sciences, and in the Center for Visual Science
James R. Ison, Ph.D. (Michigan)  Professor of Brain and Cognitive Sciences, of Psychology, and in the Center for Visual Science
Suzanne Haber, Ph.D. (Stanford)  Professor of Pharmacology and Physiology, of Neurobiology and Anatomy, of Neurology, and of Brain and Cognitive Sciences
Robert A. Jacobs, Ph.D. (Massachusetts)  Professor of Brain and Cognitive Sciences, of Psychology, of Computer Science, and in the Center of Visual Science
Carol K. Kellogg, Ph.D. (Rochester)  Professor of Brain and Cognitive Sciences and of Psychology
Rafael Korman, Ph.D. (Wisconsin)  Professor of Psychology and of Brain and Cognitive Sciences
David C. Knill, Ph.D. (Brown)  Professor of Brain and Cognitive Sciences, of Computer Science, and in the Center for Visual Science; Associate Director of the Center for Visual Science
Peter Lennie, Ph.D. (Cambridge)  Professor of Brain and Cognitive Sciences and in the Center for Visual Science
Walter Makous, Ph.D. (Brown)  Professor of Brain and Cognitive Sciences, of Psychology, of Ophthalmology, and in the Center for Visual Science
William H. Merigan, Ph.D. (Maryland)  Professor of Ophthalmology, of Environmental Medicine, of Brain and Cognitive Sciences, and in the Center for Visual Science
Elissa Newport, Ph.D. (Pennsylvania)  George Eastman Professor of Brain and Cognitive Sciences and Professor of Psychology
Ernest J. Nordeen, Ph.D. (California, Irvine)  Professor of Brain and Cognitive Sciences, of Psychology, and of Neurobiology and Anatomy
Kathy W. Nordeen, Ph.D. (California, Irvine)  Professor of Brain and Cognitive Sciences, of Psychology, and of Neurobiology and Anatomy
Gary D. Paige, Ph.D. (Chicago)  Kilian J. and Caroline E. Schmitt Professor of Neurobiology and Anatomy, Professor of Neurology, of Ophthalmology, of Biomedical Engineering, of Surgery, of Brain and Cognitive Sciences, and in the Center for Visual Science
Tatiana Pasternak, Ph.D. (Copenhagen)  Professor of Neurobiology and Anatomy, of Brain and Cognitive Sciences, and in the Center for Visual Science
Michael J. Tanenhaus, Ph.D. (Columbia)  Professor of Brain and Cognitive Sciences, of Psychology, and of Linguistics; Director, Center for Language Sciences
David R. Williams, Ph.D. (California, San Diego)  William G. Alyn Professor of Medical Optics, Professor of Brain and Cognitive Sciences, of Psychology, of Biomedical Engineering, of Ophthalmology, of Optics, and in the Center for Visual Science; Director of the Center for Visual Science
Daphne Bavelier, Ph.D. (M.I.T.)  Associate Professor of Brain and Cognitive Sciences, of Imaging Sciences, and in the Center for Visual Science
Peter Como, Ph.D. (Delaware)  Associate Professor of Neurology, of Psychiatry (Neuropsychology), and of Brain and Cognitive Sciences
Joyce McDonough, Ph.D. (Massachusetts)  Associate Professor of Linguistics and of Brain and Cognitive Sciences
Jonathan W. Mink, M.D. (Washington University)  Associate Professor of Neurology, of Neurobiology and Anatomy, of Pediatrics, and of Brain and Cognitive Sciences
William E. O’Neill, Ph.D. (SUNY, Stony Brook)  Associate Professor of Neurobiology and Anatomy and of Brain and Cognitive Sciences
Alexandre Pouget, Ph.D. (California, San Diego)  Associate Professor of Brain and Cognitive Sciences and in the Center for Visual Science
Jeffrey Runner, Ph.D. (Massachusetts, Amherst)  Associate Professor of Linguistics and of Brain and Cognitive Sciences
Ted Supalla, Ph.D. (California, San Diego)  Associate Professor of Brain and Cognitive Sciences and of Linguistics; Director, American Sign Language Program
Michael Weliky, Ph.D. (California, Berkeley)  Associate Professor of Brain and Cognitive Sciences and in the Center for Visual Science
T. Florian Jaeger, Ph.D. (Stanford)  Assistant Professor of Brain and Cognitive Sciences
Duje Tadin, Ph.D. (Vanderbilt)  Assistant Professor of Brain and Cognitive Sciences

The Department of Brain and Cognitive Sciences represents a new academic discipline that integrates biological, behavioral, and computational methods to study behavior and the brain activity that underlies it. Faculty and students study how we see and hear, move, learn and remember, reason, produce and understand spoken and signed languages, and how these remarkable capabilities depend upon the workings of the brain. Students also study how these abilities develop, and how the brain matures to become able to organize such complex behavior. Research and teaching span a large domain that touches several disciplines in the behavioral, neural, and computational sciences.

The programs in the Department of Brain and Cognitive Sciences (BCS) offer rigorous but accessible natural science concentrations for students interested in how we perceive, think, and learn, and what brain mechanisms make these abilities possible. The programs have two aims: (1) to provide sound intellectual training that will benefit students in a wide range of career paths; and (2) to provide qualification for students contemplating graduate or professional training in the behavioral and neural sciences. The curricula provide excellent routes to learn the logic and methods of scientific inquiry and how to reason critically, and provide unique opportunities to engage in research problems at the frontiers of knowledge.

The B.A. curriculum consists of two foundation courses; three core courses built on these foundations; a statistics course; a laboratory course; four upper-level electives organized around a theme chosen by each student; and a senior seminar.

The B.S. curriculum includes all the requirements for the B.A. degree in BCS, and also incorporates foundational and advanced work in related allied fields, including biology, computer science, math, and symbolic systems.

There is no requirement to undertake a research project, but students are encouraged to take advantage of the many research opportunities available in the department. All of the faculty in brain and cognitive sciences have active research programs, and qualified undergraduates can participate directly in scientific discovery through independent research courses and the honors program (see page 42).

In addition to the B.A. and B.S. in brain and cognitive sciences, the department administers the curriculum leading to a B.S. in biological sciences with specialization in neuroscience, offered through the Undergraduate Program in Biology and Medicine (see page 31). Also, in cooperation with the Department
of Clinical and Social Sciences in Psychology, the department provides a curriculum leading to a B.A. in psychology (see page 123). Further information can be obtained from the Department of Brain and Cognitive Sciences Web pages (www.bcs.rochester.edu) or the department’s Undergraduate Programs Office, 102 Meliora Hall, (585) 275-0541.

The department also offers a minor and a number of clusters (see below) that provide an introduction to the field and allow students freedom to pursue topics of special interest.

UNDERGRADUATE ORGANIZATIONS
The Department of Brain and Cognitive Sciences supports an undergraduate council for students interested in the discipline. The council organizes trips to conferences, brings in guest speakers, organizes faculty/student mixers, promotes the brain and cognitive sciences major, and holds office hours for undergraduates interested in tutoring. Additional information about this organization is available on the department’s Web pages.

REQUIREMENTS FOR THE B.A. IN BRAIN AND COGNITIVE SCIENCES
The B.A. program provides introductory background to all areas of brain and cognitive sciences and encourages deep exploration of one subfield within BCS. It differs from the B.S. in that it requires fewer courses and thus allows greater flexibility in overall program planning. The B.A. program is particularly suitable for students with focused interests in a single area of BCS and those wishing to pursue double degrees or double majors. The concentration consists of 12 courses.

- Two foundation courses (BCS 110 and 111) provide a general introduction to the field; one examines the neural machinery that underlies behavior, and the other introduces the domain of cognitive science.
- Three core courses (BCS 151, 152, 153) build on the foundation courses by providing a fuller exploration of the major scientific problems we study—perception and action, language, and cognition.
- A statistics course (BCS 200) and a laboratory course (BCS 205, 205, or 208) introduce the fundamentals of experimental design and analysis, and provide hands-on experience with how we acquire knowledge about the brain and behavior. The brain and cognitive sciences draw on a wide variety of scientific methods, and students can choose from among laboratory courses that emphasize different techniques. All courses stress analytical thinking and technical writing and provide a solid grounding for students to undertake major research projects.
- Depth of knowledge is achieved through four upper-level electives. At least three must be 200-level courses, and three of the four should form a coherent “track” around some theme within BCS. The department offers examples of common track themes (see below), but students can form their own tracks in consultation with their advisor and with the approval of the director of undergraduate studies.

Sample track themes:

**Neuropsychology and Mental Disorder**
- BCS 240. Basic Neurobiology
- BCS 242. Neuropsychology
- BCS 245. Neurochemical Foundations of Behavior
- BCS 246. Biology of Mental Disorders
- BCS 265. Language and the Brain

**Psycholinguistics**
- LIN 110. Introduction to Linguistic Analysis
- BCS 172. Development of Mind and Brain
- BCS 259. Language Development
- BCS 261. Language Use and Understanding
- BCS 264. Signed Language Structure
- BCS 265. Language and the Brain

**Perception and Action**
- BCS 191Q. Seeing and Acting in a Virtual World
- BCS 220. The Intelligent Eye
- BCS 221. Audition
- BCS 222. Foundation of Vision: Perception and Computation
- BCS 228. Human-Machine Interface
- BCS 245. Sensory and Motor Neuroscience

**Computation and Cognition**
- BCS 191Q. Seeing and Acting in a Virtual World
- BCS 222. Foundation of Vision: Perception and Computation
- BCS 230. The Computational Brain
- BCS 232. Artificial Intelligence
- BCS 268. Computer Models of Mind

**Development**
- BCS 172. Development of Mind and Brain
- BCS 240. Basic Neurobiology
- BCS 249. Developmental Neurobiology
- BCS 259. Language Development

**Music and Language Cognition**
- BCS 260. Music and the Mind
- BCS 221. Audition
- BCS 259. Language Development
- BCS 261. Language Use and Understanding
- BCS 265. Language and the Brain

**Speech and Hearing**
- LIN 110. Introduction to Linguistic Analysis
- BCS 221. Audition
- BCS 259. Language Development
- BCS 261. Language Use and Understanding
- BCS 264. Signed Language Structure
- BCS 265. Language and the Brain

REQUIREMENTS FOR THE B.S. IN BRAIN AND COGNITIVE SCIENCES
The B.S. program provides a broad and rigorous natural science education that prepares students for postgraduate work in BCS and related fields (e.g., cognitive science, computational neuroscience, computer engineering). In addition to BCS courses, the curriculum entails a foundation in math, biology, computer programming, and symbolic systems so as to prepare students for all advanced courses within our discipline. The B.S. concentration consists of 20 courses.

**General Science Foundation Courses**
(12 courses required)

- One cell biology (BIO 110)
- One calculus (MTH 161 recommended or MTH 141 acceptable)
- One symbolic systems (LIN 110, CSC 175, CSC/PHL 217, CSC 240, or 242)
- One computer programming (ECE 114, CSC 170, or 171)

**All of the B.A. Requirements**
(12 courses, see descriptions above)
- Two BCS foundations courses (BCS 110, 111)
- Three BCS core courses (BCS 151, 152, 153)
- One statistics course (BCS 200)
- One laboratory course (BCS 205 or 205 or 208)

**Allied Field Electives**
Two courses can be chosen from the list of approved allied field courses in mathematics, computer science, biology, chemistry, physics, philosophy, music theory, linguistics, optics, or engineering. The students must be BCS or approved allied field elective courses.

**Open Electives**
These can be BCS or approved allied field elective courses.

Sample track themes:

**Artificial Intelligence/Computation**
The track in artificial intelligence and computation focuses on the design of computer simulations that mimic how people create and manipulate mental and neural representations. A variety of topics can be explored within the context of this track, including the use of mental and neural representations for the purposes of sensory perception, motor action, computational reasoning, and decision making. To support these topics of interest, allied field electives typi-
cally are chosen from computer science and mathematics. This track is particularly suitable for students interested in pursuing advanced degrees in cognitive science, computational neuroscience, or artificial intelligence.

**Language**

The track in language focuses on how people produce and understand spoken and signed languages and how children learn language. A variety of topics can be explored within the context of this track, including the perception and production of speech, the development of language in children, natural language processing, the formal structure of language and computer models of language. To support these topics of interest, allied field electives typically are chosen from linguistics, computer science, and philosophy. This track is particularly suitable for students interested in pursuing advanced degrees in cognitive science, psychology, linguistics, and computational linguistics, or in more applied fields such as speech sciences and communication disorders.

**Neurobiology**

The track in neurobiology focuses on the biology of the nervous system with special emphasis on biological mechanisms of cognitive behavior. A variety of topics can be explored within the context of this track, including the physiological foundations of sensory perception and motor behavior, relationships between brain dysfunction and cognitive/behavioral deficits, and the cellular and molecular processes that influence the development of brain and behavior. To support these topics of interest, allied field electives typically are chosen from biology or chemistry. This track is particularly suitable for students interested in pursuing advanced degrees in neuroscience, neuropsychology, or medicine.

**Perception and Action**

The track in perception and action focuses on sensory systems and how humans and animals use sensory information to perceive the world and guide actions. Topics that can be studied in this track include how our eyes, ears, and other sensory organs work, how the brain interprets information from the senses for perception and action, and how to construct artificial sensory and robotic systems. To support these topics of interest, allied field electives typically are chosen from biology, physics, mathematics, and computer science. This track is well suited for students interested in pursuing advanced degrees in cognitive science, vision science, neuroscience, or artificial intelligence or more applied degrees in fields such as physical therapy, optometry, or audiology.

**HONORS PROGRAM IN BRAIN AND COGNITIVE SCIENCES**

Faculty in the department have active research programs and strongly encourage undergraduates to become engaged in research projects. A research project fosters independent thinking, encourages teamwork, and prepares a student well for postgraduate employment and advanced degree programs. Students wishing to make a substantial investment in research may do so through the honors research program. Generally, this program is begun before the end of the junior year after completion of at least one semester of independent research. Students who intend to participate in the honors research program should notify the Undergraduate Program secretary of this intent as soon as possible and no later than the end of the fall semester of their senior year. A degree with Honors in Research is awarded to students who successfully complete the following additional requirements:

1. Maintain a 3.3 GPA in BCS courses.
2. Complete two semesters of independent research with the thesis advisor. At least one semester should be registered as Honors Research (BCS 396).
3. Before enrolling in honors research, submit a three-page thesis proposal to an advisory committee consisting of the thesis advisor and one other faculty member in the department. At the same time, register a copy of this proposal in the BCS Undergraduate Program Office (102 Meliora Hall). The thesis proposal should present the background and rationale for the research, explain why the work undertaken is important, and outline the methods used to address the problem and the timeframe estimated to complete the work. The thesis proposal should be reviewed by the advisory committee no later than the end of the fall semester of the senior year. Students wishing to work with an advisor in an affiliated program must obtain prior approval from the department’s Committee on Undergraduate Studies.
4. Submit the title of the thesis and endorsing signatures from the advisory committee to the Undergraduate Program Office (102 Meliora Hall) no later than the second week of the semester in which the Senior Seminar is taken. Honors students enroll in the Honors Senior Seminar (BCS 311).
5. Prepare a written senior thesis in the form of a scientific journal article and present the thesis orally as part of the Senior Seminar. The written thesis must be received by the advisory committee no later than April 15 of the graduating year.
6. The thesis is presented formally in a public seminar and then defended at a closed meeting of the student’s advisory committee with an additional faculty member chosen by the departmental chair.

**MINOR IN BRAIN AND COGNITIVE SCIENCES**

Students can build a six-course minor in brain and cognitive sciences. All minors are based on the two foundation courses that provide an integrated introduction to the field; these are augmented by at least two of the three core courses that provide a thorough treatment of one of the major problems we study (perception and action, language, and cognition). Additional electives allow students freedom to explore the field broadly or to specialize somewhat.

- Two foundation courses
  - BCS 110. Neural Foundations of Behavior
  - BCS 111. Foundations of Cognitive Science
- At least two of the following core courses:
  - BCS 151. Perception and Action
  - BCS 152. Language and Psycholinguistics
  - BCS 153. Cognition
- One or two electives, at least one of which is numbered 200 or above (students who take only two core courses must take two electives). Elective(s) must either form a progression with the core course(s), be a methods course, or be an associated laboratory course.

The department offers a broad range of elective courses on such topics as language, perception, development, or behavioral neuroscience. No more than two courses may be counted for credit towards both the major and minor requirements.

**RELATED MINORS**

**Minor in Psychology as a Natural Science**

See the psychology program.

**Minor in Visual Science and Research Minor in Visual Science**

See Center for Visual Science.

**CLUSTERS**

Students can satisfy the College’s distribution requirements for natural science courses by completing one of the department’s nine clusters. Because we offer a range of courses at introductory, intermediate, and advanced levels, students can form clusters in different ways, choosing to emphasize breadth or depth. All clusters offered by the department require at least one foundation course followed by one intermediate course.

**Mind and Brain**

(Because of “overlap” rules, this cluster is not available to most psychology majors.)

A general introduction to perception, cognition, learning, memory, and development, considering both the nature of these processes and the brain mechanisms that underlie them.

- BCS 110. Neural Foundations of Behavior
- BCS 111. Foundations of Cognitive Science
- BCS 112. Cognitive Psychology*

Choose one:

- BCS 151. Perception and Action
- BCS 152. Language and Psycholinguistics
- BCS 153. Cognition

*Students cannot take both BCS 111 and 112.
**Language and Cognition**
An introduction to the mental processes involved in human language and cognition. Choose three:
- BCS 111. Foundations of Cognitive Science
- BCS 112. Cognitive Psychology
- BCS 152. Language and Psycholinguistics
- BCS 153. Cognition
- BCS 162. Understanding Reading
- BCS 172. Development of Mind and Brain
- BCS 183. Animal Minds
- BCS 250. Language Development
- BCS 261. Language Use and Understanding
- BCS 264. Signed Language Structure

**The Senses**
An introduction to the human senses, particularly vision and hearing, covering both the basic sensory processes and higher-level perceptual ones.
- BCS 110. Neural Foundations of Behavior
- BCS 151. Perception and Action

Choose one:
- BCS 191Q. Seeing and Acting in a Virtual World
- BCS 220. The Intelligent Eye
- BCS 221. Audition
- BCS 222. Foundations of Vision: Perception and Computation
- BCS 245. Sensory and Motor Neuroscience

**Mind, Brain, and Development**
(Because of "overlap" rules, this cluster is not available to most psychology majors.)
An introduction to the brain and cognitive processes, with a special emphasis on their development.
- BCS 110. Neural Foundations of Behavior
- BCS 111. Foundations of Cognitive Science
- BCS 112. Cognitive Psychology
- BCS 172. Development of Mind and Brain

**Perception and Development**
An introduction to perception, cognition, their development, and their underlying brain mechanisms. Choose one:
- BCS 110. Neural Foundations of Behavior
- BCS 111. Foundations of Cognitive Science
- BCS 112. Cognitive Psychology
- BCS 151. Perception and Action
- BCS 172. Development of Mind and Brain

**Language and Cognitive Development**
An introduction to the development of language and cognition and their underlying biological mechanisms.
- BCS 110. Neural Foundations of Behavior
- BCS 172. Development of Mind and Brain
- BCS 250. Language Development

**Biology and Behavior**
An introduction to animal behavior and its underlying biological and evolutionary mechanisms.
- BCS 110. Neural Foundations of Behavior
- BCS 183. Animal Minds
- BIO 260. Animal Behavior

**Neurobiology**
An introduction to the biology of the brain and the neural mechanisms underlying behavior.
- BCS 111. Principles of Biology I
- BIO 112. Perspectives in Biology I
- BCS 240. Basic Neurobiology

Choose one:
- BCS 221. Audition
- BCS 242. Neuropsychology
- BCS 243. Neurochemical Foundations of Behavior
- BCS 244. Neuroethology
- BCS 245. Sensory and Motor Neuroscience
- BCS 246. The Biology of Mental Disorders
- BCS 249. Developmental Neurobiology

**Neuropsychology**
An introduction to the biological mechanisms that underlie behavior with special emphasis on abnormal behavior.
- BCS 110. Neural Foundations of Behavior
- BCS 242. Neuropsychology
- BCS 246. The Biology of Mental Disorders

**UPPER-LEVEL WRITING REQUIREMENT**
Successful completion of a BCS degree will also satisfy the College upper-level writing requirement through significant writing experience at three levels of the curriculum: core courses, laboratory course, and Senior Seminar.

**COURSES OF INSTRUCTION**
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. See the department’s Web pages for fuller descriptions and up-to-date schedules (www.bcs.rochester.edu).

110. **Neural Foundations of Behavior.**
Introduces the structure and organization of the brain, and its role in perception, movement, thinking, and other behavior. Topics include the brain as a special kind of computer, localization of function, effects of brain damage and disorders, differences between human and animal brains, sex differences, perception and control of movement, sleep, regulation of body states and emotions, and development and aging. No prerequisites. (Fall)

111. **Foundations of Cognitive Science.**
Introduces the organization of mental processes underlying cognition and behavior. Topics include perception, language processing, learning, and memory. Integrates knowledge of cognition generated from the fields of cognitive psychology, artificial intelligence, neuroscience, linguistics, and philosophy. No prerequisites. (Fall and Spring)

112. **Cognitive Psychology.**
Provides an introduction to basic concepts in modern cognitive psychology. Topics covered include pattern recognition, attention and memory, concepts and categories, language comprehension and production, and higher-level thinking, such as reasoning and decision making. No prerequisites. (Spring)

151. **Perception and Action.**
Explores how the biology of our senses shapes perceptual experiences of reality. Emphasizes sense of sight primarily and hearing secondarily. An important theme is that our sensory systems play a crucial role in the execution of coordinated movements of our bodies, as we navigate in, and interact with, the environment. Prerequisites: BCS 110 or 111, or equivalent background. (Fall)

152. **Language and Psycholinguistics.**
An overview of the nature and processing of human languages, including comparisons between language and animal communication systems, the biological bases of human language, and the cognitive mechanisms used in producing, understanding, and learning language. Prerequisites: BCS 110 or 111 or 112; or LIN 110. (Fall)

153. **Cognition.**
Considers human cognitive processes, including behavioral and computational methods used to understand the nature of cognition. Explores how we perceive and integrate sensory information to build a coherent perception of the world; how we memorize and retrieve information; how we reason and solve problems. Prerequisite: BCS 110; BCS 111 recommended. (Spring)

172. **Development of Mind and Brain.**
Introduces human development, focusing on the ability to perceive objects and sounds, to think and reason, and to learn and remember language and other significant patterned stimulation. Includes the nature and mechanisms of development in humans and an overview of what is known about brain and behavioral development in other species. No prerequisites. (Spring)

183. **Animal Minds.**
Considers the cognitive and communicative abilities of animals, especially primates, as compared with humans. Topics include thinking, reasoning, remembering, communicating, and understanding number, time, and causality, in animals ranging from ants to apes. No prerequisites. (Fall)

191Q. **Seeing and Acting in a Virtual World.**
Explores how we extract information from the visual world, how perceptions guide our movements, and how the nervous system controls these behaviors. Emphasis is on how virtual reality technology enables us to study human response to complex environments that have previously been outside the domain of experimental control. Students use the Virtual Reality Laboratory to investigate how the brain mediates perceptual experience and motor responses. Class includes lectures and labs, and students conduct their own independent project at the end of the semester. No prerequisites. (Spring)
200. Statistical Analysis and Experimental Design with Lab. Introduces statistical methods including descriptive statistics (count, central tendency, dispersion), hypothesis testing (significance, t-test, chi-square, etc.) and elements of correlation, regression, and interaction. Emphasis is on what a technique does at a conceptual level, how a technique is reported in the literature, and how to execute a technique. No prerequisites. (Fall)

203. Laboratory in Neurobiology. Introduces various methods used in neurobiological research. Covers anatomical, behavioral, chemical, and physiological approaches to studying neural organization and function and concludes with a research project that extends over a period of five weeks. Prerequisite: BCS 200, 240, and 240L, or equivalent background with permission of instructor. Same as NSC 203. (Spring)

205. Laboratory in Development and Learning. Introduces behavioral methods used to study the development of perception, cognition, and language, and computational and neuroscientific methods used to study mechanisms of development, learning, and experiential change. Emphasizes methods for testing human infants and children. Includes observation of these experimental methods as well as opportunities for individual projects. Prerequisites: BCS 200 and one of the BCS core courses (151, 152, 155) or BCS 172, or equivalent background. (Fall)

208. Laboratory in Perception and Cognition. Introduces observational studies of perceptual and cognitive phenomena, showing how scientific questions can be answered by making such observations. Students perform, analyze, interpret, and report results from seven experiments conducted in a course sequence that gradually increases the independence of the student experimenters. Prerequisites: BCS 200 and either BCS 151 or 153. (Spring)

209. Introduction to Functional Magnetic Resonance Imaging. Provides an overview of topics relevant to functional magnetic resonance imaging (fMRI), including MRI physics, brain anatomy, experimental design, and data analysis. In the laboratory component, students use AFNI software to analyze fMRI data. The course provides a good foundation for understanding the results of fMRI studies as well as designing and implementing new fMRI experiments. Enrollment is limited to eight students, by permission of the instructor. Parts of the course are taught via teleconference from the State University of New York at Geneseo.

220. The Intelligent Eye. Provides an interdisciplinary view of modern research into how the human brain solves the problems involved in perception, including how we perceive the three-dimensional structure of the world, how we recognize objects and how visual information is used to control action in the world. Students read contemporary research and, through classroom discussion and critical essays, explore and analyze the questions and debates that define contemporary perceptual science. Prerequisite: BCS 151. (Spring)

221. Audition. examines the physiological substrate responsible for hearing. Topics include the physical stimulus for hearing, receptive aspects of speech and language, peripheral physiology (the outer and middle ears, cochlea, and auditory nerve), and central physiology (brainstem nuclei, auditory cortex, descending systems). Introduces electrophysiological techniques used to study auditory function, and explores sensory and perceptual correlates of physiology and sensorineural hearing loss. Prerequisite: BCS 110 or equivalent background. (Spring)

222. Foundations of Vision: Perception and Computation. Advanced, hands-on introduction to computational theories of biological vision. Students work through interactive computer tutorials and implement state-of-the-art models of visual processing. Prerequisites: 2 semesters calculus, previous coursework in perception or neuroscience (rudimentary knowledge of linear algebra recommended).

228. The Human-Machine Interface. Surveys the factors that influence human performance with machines and other artificial systems, including sensory and motor function, information processing, memory, motivation, decision making, problem solving, the influence of the environment, and facilitators such as instructions, performance aids, selection, and training. Includes in-depth consideration of visual displays and motor input. (Spring)

230. The Computational Brain. Explores computational models of mental processes, including philosophical, psychological, and psychophysical issues. Considers the history of trends in artificial intelligence, and case studies from problem solving, expert systems, robotics, natural language understanding, computer vision, neural nets, and learning. Prerequisites: PHL 110 and CSG 172. Same as CSG 240. (Fall)

232. Artificial Intelligence. Computer representations of facts, temporal phenomena, beliefs, physical processes, and space. Applications include planning, natural language, computer vision (physics-based vision, texture, and motion, active vision), and robotics (coordinates kinematics, dynamics, control, architectures, mobile robotics laboratory). LISP C++, and possibly MATLAB programming. Laboratory exercises involve state-of-the-art hardware and software systems. Same as CSG 242. Prerequisites: PHL 110 and CSG 172. (Spring)

233. Speech Recognition and Statistical Language Models. An introduction to statistical natural language processing and automactic speech recognition techniques. This course presents the theory and practice behind the recently developed language processing technologies that enable applications such as speech-driven dictation systems, document search engines (e.g., finding Web pages) and automatic machine translation. Prerequisites: CSG 172 and either CSG 240 or 242.
264. Signed Language Structure. Examines signed languages and the cognitive constraints that shape them, through a detailed consideration of the structure of American Sign Language and other natural signed languages of the world. Includes training in sign language notation and analysis. Knowledge of sign language is not required. Prerequisites: ASL 105; LIN 210, 220, or 226; or permission of instructor. (Spring)

265. Language and the Brain. Examines how the comprehension and production of language is implemented in the human brain. Uses evidence from neuropsychological and brain imaging studies to consider the following questions: What is the network of brain areas that subserves language processing? What are the specific functions of these areas? What happens when these brain areas are damaged? What is the timing of brain activity in these areas during language processing? Finally, how do the brain areas involved in language processing overlap with those involved in other complex cognitive processes? Prerequisites: BCS 152 and 110.

268. Computer Models of Mind. Explores how theories of human cognition, including theories of perception, language, memory, learning, categorization, and reasoning, can be implemented on a computer. Emphasis is placed on providing students with hands-on experience via a software package provided to students.

310. Senior Seminar. Credit—2 hours. Required of all senior BCS majors who do not enter the honors program. Emphasizes reading, evaluating, and discussing primary research papers. Each student chooses a topic, becomes familiar with it, selects a classic paper, leads a class discussion, and writes an evaluation of the paper as though providing peer review for a journal. Prerequisite: Senior concentrators. (Fall and Spring)

311. Senior Seminar (Honors). Credit—2 hours. Required of seniors in the BCS honors program. Students choose a classic paper for the class to read, lead a discussion of it, and give a formal oral and written presentation of their honors theses. To be taken in the semester the honors thesis is completed. Prerequisites: Senior concentrators and permission of department. (Spring)

389. Vision Science Research and Colloquium. Intended for students who are engaged in research in the Center for Vision Science and who may be considering a career in research. Provides exposure to the research environment of the Center through the regular research meetings and colloquia attended by CVS graduate students, postdocs, and faculty. Students also complete a paper on a vision-related topic. No prerequisites. Same as CVS 389. (Fall and Spring)
Wolf-Udo Schröder, Ph.D. (Darmstadt) Professor of Chemistry
Ching W. Tang, Ph.D. (Cornell) Doris Johns Cherry Professor, Professor of Chemical Engineering and of Chemistry
Douglas H. Turner, Ph.D. (Columbia) Professor of Chemistry and of Pediatrics, and in the Center for Pediatric Biomedical Research
Kara L. Bren, Ph.D. (California Institute of Technology) Associate Professor of Chemistry
Patrick L. Holland, Ph.D. (California, Berkeley) Associate Professor of Chemistry
Todd D. Krauss, Ph.D. (Cornell) Associate Professor of Chemistry
Alison J. Frontier, Ph.D. (Columbia) Assistant Professor of Chemistry
David W. McCamant, Ph.D. (California, Berkeley) Assistant Professor of Chemistry
Man Kit Ng, Ph.D. (Chicago) Assistant Professor of Chemistry
Bradley L. Nilsson, Ph.D. (Wisconsin) Assistant Professor of Chemistry
Misha Ovchinnikov, Ph.D. (Utah) Assistant Professor of Chemistry
Harry A. Stern, Ph.D. (Columbia) Assistant Professor of Chemistry
Frank P. Buff, Ph.D. (California Institute of Technology) Professor Emeritus of Chemistry
John R. Huizenga, Ph.D. (Illinois) Tracy H. Harris Professor Emeritus of Chemistry and of Physics
Jack A. Kampmeier, Ph.D. (Illinois) Professor Emeritus of Chemistry
Andrew S. Kende, Ph.D. (Harvard) Charles Frederick Houghton Professor Emeritus of Chemistry
Robert W. Krelick, Ph.D. (Washington University) Professor Emeritus of Chemistry
John S. Muentter, Ph.D. (Stanford) Professor Emeritus of Chemistry
William H. Saunders, Jr., Ph.D. (Northwestern) Professor Emeritus of Chemistry

Approximately 40 graduate teaching fellows and specially chosen undergraduates assist the faculty in the presentation of the teaching program. The majority of the teaching assistants are used in the lower-level, high-enrollment courses to help the students with questions and problem solving that arise out of the lectures and/or homework assignments.

The Department of Chemistry is committed to the search for new insights into problems in chemistry and to the presentation of our understanding of chemistry to students at all stages of the educational spectrum, from the beginner to the accomplished scholar. Thus, the department presents programs of teaching and research for undergraduate, graduate, and postdoctoral students. The size and attitudes of our department create a rich interplay among these programs. Our research and teaching goals are complementary. We want students to catch both our ideas and our enthusiasm. All faculty teach undergraduate students; all faculty are actively involved in chemical research. An undergraduate student gets the benefits of facilities and a community of faculty and students dedicated to the contemporary ideas and problems in chemistry; the faculty value the challenges and the stimulation of presenting their ideas to others and the collaboration with students that leads to new understanding. Students move easily through the spectrum of departmental activities. Undergraduates are an integral part of the research programs of the department; it is common to find a laboratory with an undergraduate, a graduate student, a postdoctoral student, and a faculty member working side by side. In a similar fashion, some of the teaching programs in the department involve faculty, postdoctoral students, graduate students, and advanced undergraduates working as a team to present ideas and techniques to beginning students.

Chemistry is a rich and fascinating subject that ranges in concern from macromolecular biopolymers to problems in subatomic structure and in time scales from eons to picoseconds. The skills of chemists range from sophisticated levels of mathematical abstraction to the elegant conception and execution involved in the synthesis of complex, naturally occurring molecules. The chemist’s view of the atomic and molecular structure of the world is one of the major intellectual forces that shape modern thought. The chemist’s skill and understanding have revolutionized many areas of modern society, such as agriculture, clothing and shelter, health care, and energy resources. The department hopes, of course, to prepare and stimulate students to professional achievement and accomplishment in chemistry. At the same time, we recognize the fundamental nature of our discipline and its proper role as the basis and complement to study and accomplishment in a host of other areas. A very large number of our students will find their fascination and aspirations in related or interdisciplinary fields. We aim to give them the insights and the skills in chemistry that will support their work in these areas.

Organic chemistry is offered with a lecture and a laboratory course each semester. The organic chemistry lectures are CHM 203 in the fall, and CHM 204 in the spring. The organic chemistry laboratories are CHM 205 in the fall, and CHM 208 or 210 (recommended for majors) in the spring.

The department offers undergraduate programs leading to both B.A. and B.S. degrees. In general, the programs differ in the choice and timing of courses in the junior and senior years; an early choice between programs is not required. Between the two programs, the students can arrange a chemistry major that covers the fundamentals as essential background for a specific career in some other area or that provides rigorous and thorough preparation for professional work in chemistry. A minor in chemistry is also available. Specific programs are described below.

B.A. PROGRAM IN CHEMISTRY
The B.A. program makes fewer specifications at the advanced level than the B.S. degree and encourages a wide range of elective courses. It is particularly suitable for students with interdisciplinary scientific interests in the health professions, biology, physics, geological sciences, engineering, or education. B.A. students may elect advanced courses in chemistry, including independent research, and can, thereby, create a curriculum best suited to their individual interests.

REQUIREMENTS FOR THE B.A. IN CHEMISTRY
• CHM 131 (or equivalent AP credit)
• CHM 171Q/203, 172Q/204, 173Q/207
• Three of the following: CHM 132, 211, 251, 252
• Two of the following: CHM 210, 231, 232, 234
• Two additional 200-level or higher chemistry courses or other science courses approved by the Undergraduate Advising Committee. No more than 4 credits may be from laboratory courses, and no credits can be from independent research. Examples of courses that may be used are available from the Chemistry Undergraduate Advising Committee or at www.chem.rochester.edu/undergrad.
• MTH 161 and 162
• MTH 165/165 or a course in computer science (CSC 170, 171) or statistics (STT 201, 211, 212)
• PHY 113–114. Students wishing a more rigorous background in physics are advised to take PHY 121–123, or 121 and 142–143, instead of 113–114.
• Additional courses in physics, mathematics, and other sciences such as biology, geology, etc., may be taken as part of the concentration.
• Satisfaction of the Upper-Level Writing Requirement.

B.A. candidates considering employment in the chemical profession or graduate work in chemistry should include CHM 210, 211, 231, 232, 251, and 252 in their curriculum.
**B.S. PROGRAM IN CHEMISTRY**

The B.S. program is designed primarily for students who anticipate professional careers in chemistry and related science. The program provides the range of knowledge, skills, and experience required for work as a professional chemist or for entry into graduate studies in chemistry. The fundamental work is completed by the end of the third year, leaving the senior year free for graduate-level coursework and a full year of independent research with one of the department faculty. A B.S. program that includes a biochemistry course meets all of the requirements for an American Chemical Society approved degree.

**REQUIREMENTS FOR THE B.S. IN CHEMISTRY**

- Either the series CHM 131, 132, 203, 204, 207, and 210 or the series CHM 131 (or equivalent AP credit), 171Q, 172Q, 173Q, 210, and CHM/BIO 250 (Biochemistry), CHM 132, or an approved 200/400-level science course.
- CHM 211, 251, and 252.
- CHM 231, 232, and 234.
- CHM 393 (senior research, 8 credits total).
- 400-level chemistry course.
- MTH 161, 162, 163/165 plus one additional course in mathematics (MTH 164 or a 200-level mathematics course), computer science (CSC 170, 171), or statistics (STT 201, 211, 212).
- PHY 121–123, or 121 and 142–143.
- Satisfaction of the Upper-Level Writing Requirement.

While the required courses leading to a B.S. in chemistry may be scheduled with some flexibility (e.g., the mathematics and physics courses), the following program is suggested:

**REGULAR SEQUENCE**

**First Year**
- CHM 151
- MTH 161
- Elective
- Elective
- PHY 121
- Elective

**Second Year**
- CHM 203
- CHM 207
- MTH 163/165
- PHY 122
- Elective

**Third Year**
- CHM 211
- CHM 231
- CHM 251
- Elective

**Fourth Year**
- CHM 393
- Elective

**QUEST SEQUENCE**

**First Year**
- CHM 171Q
- CHM 173Q
- MTH 161
- Elective

**Second Year**
- CHM 211
- MTH 163/165
- PHY 122

**Third Year**
- CHM 231
- CHM 251

**Fourth Year**
- CHM 393
- Elective

Students who complete CHM 171Q/172Q courses during their first year should consult with a chemistry advisor to plan the remainder of their program.

**REQUIREMENTS FOR A MINOR IN CHEMISTRY**

- Any six courses (4 credits or greater) in chemistry.

Courses at the 400-level may be included with the permission of the instructor. Prerequisites for advanced courses, such as prior chemistry courses or the mathematics and physics prerequisites for courses in physical chemistry, must be taken in addition to the six required chemistry courses.

Each minor will be assigned a faculty advisor who must approve the student’s proposed program, normally at the end of the sophomore year. Particular attention should be given to the intellectual coherence of the program in terms of the student’s goals. Two courses with substantial overlap of content should not be included in a program.

**UPPER-LEVEL WRITING REQUIREMENT**

All chemistry majors are required to complete two upper-level writing courses ("W" courses). At least one of these courses must be a chemistry department course selected from the list below. In each chemistry writing course students are required to submit a total of four writing requirement laboratory reports. Two types of reports are required in each course: one report is written so that a well-educated non-scientist is able to understand the content; the second report is written in a formal scientific presentation with appropriate literature references. The writing requirement may be satisfied in the following courses: CHM 210W, 231W, 232W, 234W. Students may use one writing course from another department for one of the two required writing courses.

**COURSES OF INSTRUCTION**

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

**131. Chemical Concepts, Systems, and Practices I.** Credit—5 hours. This course is an introduction to the concepts of chemistry for science and engineering students, health professions students, and as a science course for students of the humanities and social sciences. Properties of chemical systems are discussed from a macroscopic and molecular perspective with examples developed from a wide range of disciplines. The topics covered include stoichiometry, atoms and molecules, properties of gases, thermochemistry, chemical equilibrium, acids and bases, solubility equilibria, and oxidation-reduction reactions. Laboratory is an integral part of the course. Prerequisite: high school chemistry.

**132. Chemical Concepts, Systems, and Practices II.** Credit—5 hours. A continuation of Chemical Concepts, Systems, and Practices I, emphasizing molecular and macroscopic approaches to chemical systems with examples concerned with energy and the environment. Topics covered include chemical kinetics, electrochemistry, thermodynamics, properties of atoms, atomic structure, and chemical bonding. Laboratory is an integral part of the course. Prerequisite: CHM 131. 171Q/173Q and 172Q/210. Quest Organic Chemistry. A one-year exploration of the basic observations, concepts, and practice of organic chemistry, with a focus on the fundamental relationships among molecular structure and chemical reactivity. The exploration requires that students grapple with Quest issues: defining questions, evaluating evidence, weighing arguments, reflecting on epistemological issues, constructing new experiments, etc. The study of organic chemistry is carefully integrated with a review of the key concepts from general chemistry. Quest...
Organic is designed for first-year students with good preparation in chemistry (e.g., two years of general chemistry and Advanced Placement score 4 or 5, or equivalent preparation). CHM 171Q and 172Q are 4-credit courses that meet for three lectures and one two-hour workshop each week. CHM 173Q meets for one lab afternoon per week (1 credit). CHM 172Q has a required companion lab, CHM 210 (2 credits).

203. Organic Chemistry I. An introduction to organic chemistry that focuses on chemical bonding, structure and stereochemistry, reactions and reaction mechanisms of organic compounds. Prerequisites: CHM 131 and 132 or the equivalent; co-registration in CHM 207. (Fall)

204. Organic Chemistry II. A continuation of a two-semester sequence in the study of organic chemistry. Topics covered include the reactivity of various functional groups, approaches to organic synthesis, reactivity of conjugated systems, polymers and molecules of biological significance. Prerequisites: CHM 203 or the equivalent plus one semester of organic laboratory (CHM 207 or the equivalent); co-registration in CHM 208 or 210. (Spring)

207. Organic Chemistry I Laboratory. Credit—1 hour. One lab lecture and lab session per week provide an introduction to the characterization and reactivity of organic molecules. The course provides an introduction to modern laboratory techniques used in organic chemistry. Prerequisite: co-registration in CHM 203. (Fall)

208. Organic Chemistry II Laboratory. Credit—1 hour. A continuation of the laboratory sequence begun in CHM 207. One laboratory lecture and lab session per week. Prerequisites: CHM 207; co-registration in CHM 204. (Spring)

210/210W. Organic Chemistry III Laboratory. Credit—2 hours. A laboratory using advanced, modern experimental techniques. One lab lecture and two laboratory sessions per week. This laboratory is required for chemistry majors. Prerequisites: CHM 207 or 173Q; co-registration in CHM 204 or 172Q. (Spring)

211. Inorganic Chemistry. This course covers descriptive chemistry of main group elements, bonding in inorganic systems, coordination chemistry, and the properties and reactions of transition metal complexes. (Fall) 231/231W. Chemical Instrumentation. This course provides an understanding of both the method and the application of modern chemical instrumentation to chemical problems and systems. The problems are deliberately chosen to cover a range of different chemical systems. One lecture, two labs per week. Prerequisite: one year each of General and Organic Chemistry; one year each of college physics and mathematics. (Fall)

232/232W. Experimental Molecular Spectroscopy. A thorough study of the principles and practice of spectroscopic methods of modern physical chemistry. Three lectures, one lab per week. Prerequisite: CHM 231, 251. (Spring)

234/234W. Advanced Laboratory Techniques. Advanced laboratory techniques of synthesis, characterization, and analysis applied to problems in inorganic and organic chemistry. One lecture; two labs per week. Prerequisite: CHM 211 recommended. (Spring)

250. Biochemistry. An introduction to biochemistry. Topics include protein and nucleic acid structure, recombinant DNA technology, bioenergetics, enzyme kinetics and mechanism, and intermediary metabolism. (Spring)

251. Physical Chemistry I. Introduction to quantum mechanics with applications to spectroscopy and to atomic and molecular structure. Problem oriented. Prerequisites: PHY 121–123 or 113–114, MTH 163. (Fall)

252. Physical Chemistry II. Thermodynamics, statistical mechanics, solutions, and chemical kinetics. Prerequisites: PHY 121–122 or 113–114. (Spring)

352. Issues in Workshop Leadership. This course prepares students to be effective workshop leaders in chemistry courses. Topics include group dynamics, diversity, student development, learning theory, cognitive apprenticeship, metacognition, and constructivism. These ideas are developed and applied in the context of workshop practice.

*391. Independent Study. Individual study of advanced topics arranged by students. Prerequisite: registration in or credit for CHM 211. (Fall and Spring)

*392. Senior Thesis Research. Independent research directed by faculty member. To be arranged during semester preceding registration. Written report required. (Fall and Spring)

*393. Biophysical Chemistry I. Introduction to the theory and application of NMR and X-ray crystallographic techniques as used for determination of biological structures. (Spring, even years)

*402. Biophysical Chemistry II. Explores how fundamental interactions determine the structure, dynamics, and reactivity of proteins and nucleic acids. Examples are taken from the current literature with emphasis on thermodynamic, kinetic, theoretical, and site-directed mutagenesis studies. Prerequisite: CHM 252 or its equivalent. (Spring, odd years)

*411/211. Inorganic Chemistry. Descriptive chemistry of main group elements, bonding in inorganic systems, coordination chemistry, and the properties and reactions of transition metal complexes. Graduate students enroll in 411, and will have an additional assignment. (Fall)

*414. Bioinorganic Chemistry. Discussion of the role of metal ions in biological systems, especially enzymes. Uptake and regulation of metals, common spectroscopic techniques used for studying metals, and mechanisms through which they react. Other topics include metal ion toxicity, metal-based drugs, and interaction of metals with nucleic acids. (Spring)

*415. Group Theory. Credit—2 hours. Development of symmetry and group theory concepts and scope of applications to chemical problems. (Fall, first half semester)

*417. X-Ray Crystallography. Credit—2 hours. Basic principles of X-ray diffraction, symmetry, and space groups. Students also experience the single crystal diffraction experiment, which includes crystal mounting, data collection, structure solution and refinement, and the reporting of crystallographic data. (Fall, second half semester)

*421. Basic Organometallic Chemistry. Credit—2 hours. Examination of the concepts, systems, reactions, and applications of organometallic chemistry. Structure and bonding of complexes having carbon, alkyl, carbene, olefin, GrHn, and related pl ligands. Oxidative addition, insertion, elimination reactions, and other fundamental reactions of organometallic compounds. (Fall, first half semester)

*422. Nuclear Magnetic Resonance Spectroscopy. Credit—2 hours. An introduction to NMR spectroscopy. Collection, processing, and interpretation of homonuclear and heteronuclear 1D and multidimensional spectra are covered. Topics discussed include chemical shifts, relaxation, and exchange phenomena. Examples from organic, inorganic, and biological chemistry are used. (Spring, first half semester)

*423. Organometallic Chemistry—Survey. Credit—2 hours. Mechanisms in organometallic reactions. Applications of organometallic compounds in homogeneous catalysis, polymerization, metathesis. Prerequisite: CHM 421. (Fall, second half semester)

*424. Physical Methods in Inorganic Chemistry. Credit—2 hours. Molecular and electronic structure determination of inorganic compounds and metal complexes; spectroscopic and physical methods. Prerequisite: CHM 422. (Spring, second half semester)

*426. Organic Structure Determination Techniques. Credit—2 hours. The modern methods and tools employed for the determination of the structure of complex organic molecules are discussed. Among the areas discussed are basic NMR (1D and 2D), IR, UV, and mass spectroscopy. Problem-solving techniques are illustrated and problem-solving skills developed by means of problem sets and class examples. Prerequisite: CHM 422. (Spring, second half semester)

*433. Advanced Physical Organic Chemistry I. An understanding of the structure and reactivity of organic compounds by using molecular orbital theory is provided. Some perspectives on the relationships among structure, mechanism, and reac-
*434. Advanced Physical Organic Chemistry II. Structure and reactivity; kinetics, catalysis, medium effects, transition state theory, kinetic isotope effects, photochemistry, reactive intermediates, and mechanisms. (Spring)

*435. Organic Reactions. A survey of reactions of organic substances with emphasis on those with practical synthetic utility including discussion of mechanism, scope and limitations, and stereochemical issues. (Fall)

*436. Organometallic Chemistry for Organic Synthesis. The transition metal mediated organometallic reactions most commonly employed in organic synthesis are discussed including their substrate scope, mechanism, and stereo- and/or regiochemical aspects. Emphasis is placed on the practical aspects such as catalyst and reaction condition selection, and protocols for trouble shooting catalytic cycles. Prerequisite: CHM 421. (Spring, second half semester)

*437. Bioorganic Chemistry and Chemical Biology. An introduction to bioorganic chemistry and chemical biology. The course draws heavily from the primary literature to present a survey of how the principles of organic chemistry have been used to explain and exploit biological phenomena. Course topics include the use of organic chemistry to understand oligonucleotides, proteins, and oligosaccharides; design of organic molecules for recognition and catalysis in biological systems; chemical genetics; introduction to principles of drug design. (Fall)

*438. Advanced Synthetic Strategy. Credit—2 hours. A formalism describing commonly employed strategies and tactics for the analysis of complex problems in organic synthesis is presented. Examples of such strategies are compared and contrasted during discussion of published complex molecule syntheses. Prerequisite: CHM 435. (Spring, first half semester)

*450. Biochemistry. An introduction to biochemistry. Topics covered include protein and nucleic acid structure, recombinant DNA technology, bioenergetics, enzyme kinetics and mechanism, and intermediary metabolism. (Spring)

*451. Quantum Chemistry I. Basic quantum chemistry, Schrödinger equation, basic postulates of quantum mechanics, angular momentum, perturbation theory, and molecular structure. (Fall)

*452. Quantum Chemistry II. Continuation of CHM 451. Matrix formulation of quantum mechanics, time evolution of quantum mechanical systems, density matrices, theories of molecular electronic structure, time-dependent problem, and interaction of radiation with matter, including absorption, emission, and multiphoton process. Prerequisite: CHM 451. (Spring)

*455. Thermodynamics and Statistical Mechanics. The course covers connections between the orderly and chaotic behavior of simple and complex systems, laying the foundations of statistical equilibrium and equilibrium thermodynamics. The different phases of matter (gases, liquids, solids) assumed by bulk classical interacting particles and their transitions are discussed in this approximation. Properties of noninteracting quanta systems are expressed in terms of partition functions, for gases of simple and complex particles. Nonequilibrium statistical behavior of multiparticle systems leads to diffusion and other transport phenomena. (Fall)

*458. Molecular Spectroscopy and Structure. Credit—2 hours. The course covers the basic theory and experimental practice of spectroscopy in molecules and condensed matter. A general review of electromagnetic waves is followed by time-dependent perturbation theory and a density matrix treatment of two-level systems. The basic principles are applied electronic, vibrational, and rotational spectroscopy. This course draws heavily on literature studies that exemplify the material. Prerequisites: CHM 451 or 251 and 222 or permission of instructor. (Fall, first half semester)

*460. Chemical Kinetics. Credit—2 hours. Within the broad area of chemical kinetics, this course focuses on basic concepts of kinetics, photochemistry, and electron-transfer (eT). In addition to studying bulk reaction rates, we discuss Marcus’s theory of eT, intramolecular vibrational energy redistribution (IVR) and vibrational cooling, and the fates of photoexcited species (radiative and nonradiative decay channels). We address the experimental quantification of these kinetics using time-resolved spectroscopy and analysis of kinetic data. The course material is somewhat continuous with that of CHM 458, Molecular Spectroscopy. (Fall, second half semester)

*466. Nuclear Science and Technology. I. Nuclear technologies of measurement, accelerators and radiation detection, effects and applications of radiation. Fundamental particles interactions, quark model. Nuclear masses, sizes, and shapes. Overview of microscopic and macroscopic models of the nucleus. Nuclear radioactivity and decay modes. Introduction to nuclear reaction theory, classical potential scattering, semiclassical and quantal models of scattering, nuclear excitation, and mass transfer. Mathcad computer projects. (Spring)

*470. Computational Chemistry. In this course students learn about a range of computational methods used to attack research problems in chemistry. Emphasis is placed both on the theory underlying computational techniques and on their practical application. Topics include molecular mechanics, ab initio electronic structure theory, density functional theory, molecular dynamics and Monte Carlo simulations, methods for free-energy calculations, path-integral techniques, and methods for protein structure prediction. Prerequisite: CHM 251. (Fall)

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**CLINICAL AND SOCIAL SCIENCES IN PSYCHOLOGY**

Patrick Davies, Ph.D. (West Virginia)  Professor of Psychology
Edward L. Deci, Ph.D. (Carnegie Mellon)  Professor of Psychology
Helen E. and Fred H. Gouw Professor in the Social Sciences and Professor of Psychology
Andrew Elliot, Ph.D. (Wisconsin, Madison)  Professor of Psychology
Rafael Klorman, Ph.D. (Wisconsin, Madison)  Professor of Psychology and of Brain and Cognitive Sciences
Dale W. McAdams, Ph.D. (Iowa)  Professor of Psychology
Harry Reis, Ph.D. (New York)  Professor of Psychology
Richard Ryan, Ph.D. (Rochester)  Professor of Psychology, of Psychiatry and of Education
Judith Smetana, Ph.D. (California, Santa Cruz)  Professor of Psychology
Miron Zuckerman, Ph.D. (Harvard)  Professor of Psychology, Chair of the Department
Loisa Bennett, Ph.D. (Denver)  Associate Professor of Psychology and of Pediatrics
Sheree Toth, Ph.D. (Case Western Reserve)  Associate Professor of Psychology
David J. McDowell, Ph.D. (California, Riverside)  Assistant Professor of Psychology
Ronald D. Rogge, Ph.D. (California, Los Angeles)  Assistant Professor of Psychology
Barbara Iaridi, Ph.D. (Stanford)  Professor Emeritus of Sociology
Ladd Wheeler, Ph.D. (Minnesota)  Professor Emeritus of Psychology
Melvin Zax, Ph.D. (Tennessee)  Professor Emeritus of Psychology

The department uses teaching assistants in laboratories and as discussion group leaders in large courses.

The Department of Clinical and Social Sciences in Psychology offers programs of study leading to a bachelor’s degree in psychology and Ph.D. degrees in clinical psychology, social-personality psychology, and developmental psychology. (See Psychology, page 123, for a description of the psychology major.) The department also offers several clusters in the social sciences.
The department offers instruction in a wide variety of topics, including social psychology, clinical psychology, personality, motivation, and social and emotional development. In all of these areas courses are offered at a broad entry level and also at a more specific advanced level. Parallel to the content-oriented courses, a series of courses on research methodology and statistics is also offered. Here the intent is to introduce the student to the research tools with which psychologists acquire their knowledge because how the research is done can often shed light on what the research has found.

In addition to the standard course offerings, students may pursue their research interests through independent study courses that are offered by individual faculty. These courses offer an opportunity to work closely with a researcher on an ongoing project. For many students, an independent study course is the first step along the path that leads to the honors program. Students can also gain practical experience and earn course credit through various internships. These special offerings are particularly aimed at students intending to pursue graduate degrees in psychology, but other interested students are not excluded. Undergraduates can also register for graduate-level courses with the permission of the advisor and the course instructor.

MAJOR IN PSYCHOLOGY
See Psychology (page 123) for a description of the psychology major.

MINORS IN PSYCHOLOGY
See Psychology (page 123) for a description of the psychology minor.

CLUSTERS IN CLINICAL AND SOCIAL SCIENCES IN PSYCHOLOGY
The following are currently approved or pending social science clusters offered by the department.

Psychology as a Social Science
- PSY 101. Introduction to Psychology
- Two from the following:
  - PSY 113. Biopsychology of Social and Clinical Behaviors
  - CSP/PSY 161. Social Psychology and Individual Differences
  - CSP/PSY 171. Social and Emotional Development
  - CSP/PSY 181. Theories of Personality and Psychotherapy
  - CSP/PSY 262. Human Motivation and Emotion
  - CSP/PSY 263. Relationship Process and Emotions
  - CSP/PSY 264. Industrial and Organizational Psychology
  - CSP/PSY 267. Psychology of Gender
  - CSP/PSY 278. Adolescent Psychology
  - CSP/PSY 282. Abnormal Psychology

Psychopathology
- CSP/PSY 282. Abnormal Psychology
- Two from the following:
  - CSP/PSY 181. Theories of Personality and Psychotherapy
  - CSP/PSY 280. Clinical Psychology
  - CSP/PSY 283. Behavioral Medicine
  - CSP/PSY 289. Developmental Child Psychopathology
- One of the following may be included
  - PSY 242. Neuropsychology
  - PSY 246. Biology of Mental Disorders

Psychology of Motivation
- CSP/PSY 262. Human Motivation and Emotion
- One (only) of the following:
  - CSP/PSY 161. Social Psychology and Individual Differences
  - CSP/PSY 181. Theories of Personality and Psychotherapy
- One of the following:
  - CSP/PSY 263. Relationship Process and Emotions
  - CSP/PSY 368W. Seminar in Humanistic Psychology
  - CSP/PSY 376. Seminar in Self-Determination
  - CSP/PSY 398. Research in Motivation

Social Psychology
- CSP/PSY 161. Social Psychology and Individual Differences
- Two from the following:
  - CSP/PSY 262. Human Motivation and Emotion
  - CSP/PSY 263. Relationship Process and Emotions
  - CSP/PSY 267. Psychology of Gender
  - CSP 556. Social Psychology of Control

Organizational Psychology
- CSP/PSY 264. Industrial and Organizational Psychology
- Two from the following:
  - CSP/PSY 161. Social Psychology and Individual Differences
  - CSP/PSY 181. Theories of Personality and Psychotherapy
  - CSP/PSY 262. Human Motivation and Emotion

Personality Psychology
- CSP/PSY 181. Theories of Personality and Psychotherapy
- Two from the following:
  - CSP/PSY 161. Social Psychology and Individual Differences
  - CSP/PSY 171. Social and Emotional Development
  - CSP/PSY 262. Human Motivation and Emotion
  - CSP/PSY 267. Psychology of Gender
  - CSP/PSY 364. Achievement Motivation
  - CSP/PSY 373. Exploring Research in Social Psychology

Psychology of Developmental Disabilities
- Choose three of the following:
  - CSP/PSY 282. Abnormal Psychology
  - CSP/PSY 289. Developmental Child Psychopathology
  - CSP/PSY 381. Psychology of Developmental Disabilities
  - CSP/PSY 384 and/or 385. Practicum in Developmental Disabilities
  - CSP/PSY 391. Independent Study Related to Developmental Disabilities
  - PM 427. Special Topics in Disabilities

Social and Emotional Development
- CSP/PSY 171. Social and Emotional Development
- Two from the following:
  - CSP/PSY 278. Adolescent Development
  - CSP/PSY 289. Developmental Child Psychopathology
  - CSP/PSY 371. Seminar in Social and Personality Development
  - CSP/PSY 377. Research in Family Psychology I
  - CSP/PSY 378. Research in Family Psychology II
  - CSP/PSY 383. Moral Development

CORE COURSES

113. Biopsychology of Social and Clinical Behaviors. An exploration of biological explanations of topics in social and clinical psychology, e.g., emotions, sexuality, psychopathology, and addiction. (Spring)

161. Social Psychology and Individual Differences. An introduction to the field of social psychology and an overview of research on individual differences in personality. Topics include the self, attitudes, social cognition, emotion, interpersonal attraction, relationships, helping, social influence, group behavior, and dispositional differences among people. Students complete several individual differences measures and receive individualized feedback at the end of the course. Format is lectures augmented with discussions and demonstrations. (Spring)

171. Social and Emotional Development. An examination of the interpersonal, emotional, cognitive, and environmental factors that influence children’s social and emotional development from early infancy through late adolescence. (Fall)

181. Theories of Personality and Psychotherapy. A survey of personality, emphasizing modern theoretical approaches, basic methods of investigation, and the relations of these theories to psychotherapy and behavioral change. (Fall)
RESEARCH METHODOLOGY AND LABORATORY OR PRACTICUM COURSES

211. Introduction to Statistical Methods in Psychology.
Introduction to the use of statistics in psychological research. Topics include descriptive statistics, correlation and regression, and inferential statistics. Examples are drawn from social and personality psychology. Logic of statistical inference and proper interpretation of research findings are emphasized. (Fall and Spring)

219W. Research Methods in Psychology.
An introduction to the basic concepts, logic, and procedures needed to do psychological research. Hands-on experience with all major phases of the research process is provided, including surveying the existing literature, developing research hypotheses, collecting and analyzing data, and reporting the results in manuscript form. (Fall and Spring)

351. Research in Developmental Neuropsychology.
This course provides guided, direct research experiences in developmental neuropsychology with a particular focus on autism and other developmental disabilities. (Fall)

352. Research in Developmental Neuropsychology.
A continuation of 351. (Spring)

356. Research in Adolescent Development.
This course provides guided, direct experiences with research on adolescent development, with a particular focus on adolescence in the context of family relationships. (Fall and Spring)

First-hand team experience with ongoing research in social psychology areas. (Fall and Spring)

377. Exploring Research in Family Psychology I.
Provides guided, direct, research experiences in investigating the interplay between family relationships and children’s social and emotional development. Emphasis is placed on gaining knowledge in translating theories (e.g., family systems theory) into empirically testable hypotheses and designing research methods and techniques to test predictions. (Fall)

378. Exploring Research in Social Psychology II.
A continuation of 377. (Spring)

384. Practicum in Developmental Disabilities I.
Explores educational, therapeutic, and social challenges in developmental disabilities. Students spend approximately eight hours per week in a supervised educational or treatment setting as well as participate in weekly meetings to review and discuss general issues in the field. (Fall)

385. Practicum in Developmental Disabilities II.
A continuation of 384. (Spring)

388. Research Practicum in Developmental Psychopathology I.
Experience in conducting research in the area of developmental psychopathology involving patterns of development in high-risk children. (Fall)

389. Research Practicum in Developmental Psychopathology II.
A continuation of 388. (Spring)

390. Supervised Teaching in Psychology.
Teaching of topics in psychology within a regular course under an instructor’s supervision. (Fall and Spring)

Supervised research on topics in psychology. May be repeated. An Independent Studies Fair is held at the beginning of each semester to facilitate linkages between students and researchers. (Fall and Spring)

392. Practicum in Psychology.
Supervised reading and experience in an applied setting. Essential supervision by a University instructor only. (Fall and Spring)

394. Internship in Psychology.
Experience in an applied setting supervised on site. Approved and overseen by a University instructor. Limit: two internships in program. (Fall and Spring)

SPECIAL COURSES INCLUDING HONORS COURSES

100. Psychology Here and Now. An orientation to courses, research, and other activities of psychology at the University of Rochester. (Spring)

282. Abnormal Psychology.
Provides a conceptual overview to the field of psychopathology. Assessment and diagnosis, etiology, developmental course, treatment, and prognosis of the major psychological disorders are discussed. (Spring)

An overview of the application of behavior/lifestyle change approaches to the treatment of medical disorders, and the examination of interfaces between behavior and physiology. Topics include diabetes, cardiovascular risk factors, chronic pain, and cancer. (Spring)

Presents theory, research, assessment, and intervention in child and adolescent psychological disorder. Contributions of the normal developmental perspective to understanding psychopathology and risk, and vice versa, are emphasized. (Spring)

LECTURE COURSES

262. Human Motivation and Emotion.
A study of the motivational and emotional processes and theories that underlie both adaptive and maladaptive behavior. Includes consideration of research largely with human subjects. (Spring)

265. Relationship Process and Emotions.
Relationships are among the most important endeavors of human activity. In the past two decades, extensive theory and research has been devoted to understanding the processes of regulating people’s thoughts, feelings, and behavior in meaningful relationships with friends, family, and romantic partners. The purpose of this seminar is to explore this literature. Psychological research on such important topics as attachment, emotion, intimacy, conflict resolution, relationship differences and similarities, and the impact of relationships on physical health and emotional well-being are examined (as well as other topics that may arise). (Fall)

264. Industrial and Organizational Psychology.
Applications of psychological theory and research in work settings. Topics include personnel selection, training and appraisal, organizational structure and transformation; performance in work groups; motivation and satisfaction; leadership; work conditions; and cross-cultural issues. (Fall)

267. Psychology of Gender.
Exploration of the ways males and females differ in interaction, theories of development of sex differences, consequences for social change. (Fall)

276. Psychology of Parenting.
Parenting and family life are emphasized from developmental, ecological, and cross-cultural perspectives. Caregiving in diverse family forms and cultures is studied in relation to adult-child interactions, parent/school/community relations, family roles, laws, and parenting skills. Issues related to aspects of diversity in contemporary families are included. Prerequisite: PSY 171. (Fall)

278. Adolescent Development.
This course surveys theory and research relating to normal development during adolescence. Adolescent development is examined in a variety of contexts, including families, peer groups, and schools, and issues pertaining to biological, social, and cognitive development are discussed. (Spring)

280. Clinical Psychology.
An introduction to the field of clinical psychology. Students are exposed to prevalent theoretical and research models, as well as approaches and research findings to assessment and diagnosis, and treatment modalities. Prerequisites: PSY 101, PSY 282 or PSY 289. (Spring)

281. Abnormal Psychology.
This course provides a conceptual overview to the field of psychopathology. Assessment and diagnosis, etiology, developmental course, treatment, and prognosis of the major psychological disorders are discussed. Current theory and research are emphasized. (Spring)

SEMINAR COURSES

Prerequisites typically include prior coursework in the subarea and permission of the instructor.

301. Teaching Psychology.
In-depth consideration of topics in psychology and their communication. PSY 101 is a lab for this course. Prerequisite: permission of instructor is required. (Fall)

Considers critical theories and research dealing with the processes of formation and change in the self-concept. This course is intended for advanced undergraduates and
requires a major research paper, which should involve data gathering. During the first part of the course, students read classic and contemporary theory and research in the area. During the second part of the course students read in selected topics and present their original research proposal and results.

**364. Achievement and Motivation.** Seminar on achievement motivation, including achievement motives, achievement goals, and the strategies individuals use in achievement settings. (Spring)

**366. Social Psychology and Control.** Determinants and consequences of the need for control and perceived control, and their relation to individual and social behavior.

**367W. Gender and Mental Health.** This seminar examines the multiple ways in which gender-related factors impact mental health, from a biopsychosocial perspective. We discuss gender-related issues in assessment and treatment, as well as in the prevalence, etiology, course, and outcome of selected psychological disorders. (Fall)

**368W. Seminar in Humanistic Psychology.** An introduction to the theory and methods of humanistic psychology with particular emphasis on humanistic approaches to psychotherapy and growth. The approach is learning through experience. The class employs the methods of humanistic psychology, including demonstrations and experimentation. Assignments include regular reading and writing. Writing requires the applications of theory to one's own life experiences. This is an upper-level writing course for all participants. (Fall)

**371. Seminar in Social and Personality Development.** Guided by a family systems perspective, this seminar explores children's social and emotional development within contexts of parent-child, interparental, and sibling relationships. Designed for advanced undergraduate students, the course primarily covers research findings and theories and requires research proposal writing and class presentations.

**376. Seminar in Self-Determination.** Deals with the field of human motivation with particular emphasis on intrinsic motivation and the meaning of self-determination in human functioning. A theoretically oriented course that reviews a range of research projects.

**380. Theoretical Perspectives on Psychotherapy.** This course focuses on foundational perspectives concerning human behavior change, including psychoanalytic, humanistic, behavioral, and social-cognitive approaches. Theoretical and practical issues concerning processes of motivation and behavior change in the contexts of child development, psychotherapy, medicine, and other applied fields are addressed.

**381. Psychology of Developmental Disabilities.** This course provides an introduction to the unique characteristics and challenges of individuals with developmental disabilities across the lifespan. We address the main concepts and issues involved in the identification, treatment, education, and support of children and adults with mental retardation and other developmental disabilities. We also explore current beliefs about intelligence, historical trends in society's perspectives on disabilities, and legal and ethical considerations. The class format includes both lecture and discussion. (Fall)

**383. Moral Development.** This seminar focuses on the psychological study of moral development. Different theoretical approaches to morality and related empirical research are discussed. The primary focus is from a developmental psychology perspective, but philosophical and educational issues also are considered. (Fall)

**386. Advanced Emotional Development.** Examines normative growth and individual differences in emotional development from birth through adolescence. Within each major developmental period, advances in the expression, regulation, and understanding of emotions is explored. The effects of culture and socialization practices on emotional development is emphasized.

**396. Special Topics in Psychology.** Consideration of recent experimental and theoretical contributions in several selected areas of psychology.
field—enduring foundations whose relevance is not tied to a particular decade, technology, or activity (such as programming). Additionally, all computer science majors are given a broad and relatively advanced exposure to the subareas of computer science. Finally, all B.S. majors are given truly exceptional participatory access to advanced courses, to a faculty composed of prominent researchers, and to state-of-the-art facilities.

PRE-MAJOR REQUIREMENTS
The B.S. and B.A. programs and the minor in computer science require a set of pre-major courses that must be completed before acceptance into the program. The following six courses cover the formal foundations of computer science and the basic techniques of programming:
- MTH 150. Discrete Mathematics
- MTH 161. Calculus I
- MTH 162. Calculus II
- CSC 171. Computer Programming (or AP credit, programming experience, etc.)
- CSC 172. Data Structures
- CSC 173. Computation and Formal Systems

To be admitted into one of the computer science degree programs, students must attain a grade of C- or higher in each of the above six courses and a GPA of no lower than 2.0 in these courses. Students who plan to complete a computer science major or minor must not take these courses on a pass-fail basis. However, marginal performance in any pre-major course is a strong predictor of unsatisfactory performance in future computer science courses. Computer science faculty rely primarily on pre-major course performance in advising prospective majors and minors. After the pre-major requirements are met, these courses are not included in the final GPA calculation for the B.S., the B.A., or the minor. Though the pre-major requirements can usually be completed by the end of the sophomore year, the program is flexible enough to accommodate those who start their computer science courses as sophomores.

COMPUTER SCIENCE MAJORS
Core Courses
To satisfy the requirements for the B.S. or B.A. degree, students must take the following core courses:
- CSC 242. Artificial Intelligence
- CSC 252. Computer Organization
- CSC 254. Programming Language Design and Implementation
- CSC 280. Computer Models and Limitations
- CSC 282. Design and Analysis of Efficient Algorithms

For the B.S. degree, students must take the following additional core courses:
- CSC 200/200H. Undergraduate Problem Seminar
- MTH 165. Linear Algebra with Differential Equations

It is the department’s current policy to allow, students who take both MTH 163 and MTH 235 to count this two-course sequence as covering the MTH 165 requirement.

Advanced Course Requirements for the B.S. Degree
In addition to the core courses, the B.S. degree requires three additional advanced courses in computer science (numbered above 200). Specialization is encouraged, though not mandatory; it helps prepare for participation in research and for senior-year independent work. Specialized tracks can be constructed from the following course topic groups; consult the advisor about track choice.
- CSC 255, 256, 257, 258. Computer Systems
- CSC 217, 219, 242, 244, 247, 248. Natural Language and Knowledge Representation
- CSC 246, 249. Vision and Robotics
- CSC 264, 284, 286, 287. Theory Students must also complete either a one-semester senior project (CSC 393) in one of the areas listed above or one additional advanced course in computer science (numbered 200 or higher) or mathematics (MTH 163, 164, 173, 174, or any additional mathematics course numbered above 200). Especially appropriate are the mathematics courses in probability, linear programming and game theory, chaos and fractals, logic, number theory and cryptography, combinatorics, and graph theory. Courses numbered above 200 or above in other related disciplines (e.g., philosophy, linguistics, electrical engineering) will also be accepted. CIS 225 will be accepted (CIS 215 will no longer be accepted). Supervised Teaching (CSC 390) may not count toward advanced course requirements.

Honors Research Program
The computer science honors research program, leading to the "honors in research," "high honors in research," or "highest honors in research" honor at graduation, is a version of the B.S. concentration program in which honors-level coursework and a senior research thesis are required.

Advanced Course Requirements for the B.A. Degree
In addition to the core courses, students must complete two advanced courses in computer science (courses numbered 200 or higher), mathematics (MTH 163, 164, 173, 174, or any course numbered above 200), or other related disciplines (e.g., philosophy, linguistics, electrical and computer engineering). CIS 225 will be accepted (CIS 215 will no longer be accepted). Supervised Teaching (CSC 390) may not count toward advanced course requirements. At least one advanced course must be in computer science.

COMPUTER SCIENCE MINOR
A minor in computer science requires all of the pre-major requirements (formal foundations and basic programming techniques) and three of the core courses in computer science (CSC 242, 252, 254 280, 282). The minor can be arranged to provide general competence or can follow a specialized track.

3-2 PROGRAM
The 3-2 program allows undergraduate students to complete a master’s degree in computer science at the end of their fifth year. Students interested in this program typically have AP/transfer credits as entering freshmen that allow them a more advanced standing. With careful schedule planning in the sophomore year, students could arrange to complete undergraduate requirements and begin graduate requirements within four years, and spend the fifth year taking the remaining graduate course requirements and writing a master’s thesis. Students wishing to apply should complete the University of Rochester graduate application no later than November 15 of their junior year. Three letters of recommendation from University faculty and a minimum GPA are required.

INDUSTRY PRACTICUM
An elective industrial partnership program is being developed that allows students to spend up to six months (usually a summer and an adjacent semester) working in an industrial setting. Graduation thus is delayed one semester. Interested students should plan their studies to ensure that all their academic program requirements are met despite the semester away.

CLUSTERS
Computer science currently offers eight clusters:
- Foundations of Computer Science: CSC 171, 172, 173. This is the main course sequence leading into the CS majors and minor. It provides a thorough overview of foundational computer science techniques and issues. Prerequisite: none, but those with no computer experience may consider taking CSC 108 before starting this sequence.
- Theory of Computation: CSC 172, 173, 280. Emphasizes mathematical models of the computational process, limitations on what is computable, the inherent complexity of practical problems, and the design and analysis of efficient algorithms. Prerequisite: familiarity with a high-level language like C++ or Java equivalent to CSC 171.
- Computer Systems: CSC 171 or 173, 257, 252. Covers the internal organization of computers and its relation to recent computer hardware developments as well as to classical topics in computer software such as compilers and operating systems. Prerequisite: familiarity with a high-level language like C++ or Java equivalent to CSC 171.
- Business Computing: CSC 170 or 171, 108, CIS 215 or 225. An introduction to software packages, computing, and computerized business systems analysis. The mixture of programming skills and power analysis
packages like Excel is a strong foundation for serious applications. Prerequisite: none.

• Computer Science and Art: CSC 108, AH 100, or CSC 190 I and II, choice of CSC 170 or 171. This cluster introduces students to the use of computers in visual art. Such uses are increasingly common since the advent of the World Wide Web.

• Computing for the Social Sciences: CSC 108, one of the following: STT 211, 212, 213, PSC 200, or 201) and either CSC 170 or 171. This cluster introduces students to powerful software packages and fundamentals of computer programming. There is a special emphasis on computation done in the context of the social sciences.

• Algorithms: CSC172, 282, and either 171 or 173. Emphasizes algorithmic thought, use of data structures, and the design and analysis of efficient algorithms.

• Concepts in Computing: CSC 101, either 170 or 171, either CSC 108 or MTH 150. This cluster provides a survey of the field of computer science. It includes both practical hands-on beginner skills and a broad introduction to the research challenges faced by today’s computer scientists.

DEPARTMENTAL DISTINCTION
Departmental distinction in computer science, for both the B.A. and B.S. degrees, will be determined by the student’s GPA on the courses that constitute the program of study for the concentration. The minimum scores for the three levels of distinction will be 3.3 (Distinction), 3.5 (High Distinction), and 3.7 (Highest Distinction).

UPPER-LEVEL WRITING REQUIREMENT
Every computer science major must develop, in consultation with his or her advisor, a plan that includes two upper-level writing “experiences.” Each experience must generate at least 25 pages of expository prose, with substantial feedback on content and form, and revision of the work. (The 25 pages may be in the form of a single major paper, or a series of smaller papers in a coherent context, e.g., a course.) The plan must be described in writing, on a form signed by both the student and the advisor. Full information is available from the department.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. See department’s Web site: www.cs.rochester.edu. Following are some of the recent or planned offerings.

101. Computer Science without Programming. What is computer science all about? Should I be interested in computer science as a major? Can I explore computer science without having to program? This course offers an overview of computer science as a discipline. The course is built upon three major focuses: (1) fundamental concepts in computer science, including hardware, software, information representation, computer operation, algorithms, compilation, debugging, HTML, WWW, and searching on the Internet; (2) traditional topics in the field, including information security, artificial intelligence, human computer interaction, computer systems, and theory of computation; and (3) modern applications of computer science, including bioinformatics, Internet search engines, virtual reality, and electronic commerce. The course activities include weekly reading and Internet search assignments, midterm and final exam, and one term paper. No programming is required. The course has no prerequisites. (Fall, Spring, and Summer)

108. Introduction to Computers. A practical introduction to computing for students in the humanities, social sciences, and business. Topics covered include stand-alone applications (word processing, spreadsheets, databases); Internet tools (Web browsers, e-mail, file transfer, Web page creation); basic computer technology (how computers work, how they are programmed, what their limitations are); and broader social issues (technological trends, computer ethics, the impact of computing on society). Lab required. No prerequisites. (Fall, Spring, and Summer)

170. Introductory Computer Programming. The course is taught using the Java Script programming language and HTML, but it emphasizes algorithmic thinking and creative problem solving over language specifics. Grades are based on projects and exams. Prospective majors lacking experience can take this course, possibly preceded even by CSC 108, in the freshman year, and begin the late-start B.A. in the fall of the sophomore year. This course also serves students who want to learn programming, but whose educational goals do not require the scope of coverage found in CSC 171. Lab required. No prerequisites. (Fall and Spring)

171. Computer Programming. Discovering, formulating, and exploiting the structure of problems to aid in their solution by computer. An introduction to algorithmic problem solving and computer programming in Java. This is the first course in the pre-major sequence, intended for students with prior programming experience. No formal prerequisites. Lab required. (Fall)

172. Data Structures. Representing data for computer manipulations (e.g., trees, lists, sets, stacks, and queues) in a high-level language (currently Java). Analysis of the running times of programs operating on such data structures, and basic techniques for program design, analysis, and proof of correctness (e.g., induction and recursion). Lab required. Prerequisite: CSC 171 or equivalent; MTH 150 recommended. (Spring)

173. Computation and Formal Systems. The conceptual and mathematical foundations of computer science and their application to advanced programming. Prerequisite: CSC 172. (Fall)

190. Issues in Computing. This course covers special topics of current interest and differs each time it is offered. Possibilities include computerized mathematics packages; recreational graphics; history of computing; programming in LISP, social implications of computing technology; using the Internet; E-commerce. General prerequisite: none (may vary with course). (Fall and/or Spring; not offered every semester)

200 (200H). Undergraduate Problem Seminar Honors. Intensive seminar on cooperative problem solving. Overview of the subdisciplines and the research of the University of Rochester’s computer science faculty. Required for the honors B.S. in computer science; optional elective for the B.S. and B.A. Prerequisites: all pre-major requirements. (Spring)

217. Uncertain Inference. The focus of the course is the problem of quantifying the uncertainty that characterizes most inference outside of logic and mathematics. This is important to both philosophy and AI. The various probabilistic and non-probabilistic measures that have been proposed are explored and evaluated. Students in this course may receive upper-level writing credit. Prerequisite: PHIL 110 or permission of instructor. Same as PHIL 217. (Fall)

219. Deviant Logic. This course is concerned with the study of “alternative” logics: logics in which more than two truth values are possible, logics in which not every statement has a truth value, logics that are designed to accommodate vagueness, logics that allow inconsistencies. Some of these alternatives have been suggested on philosophical grounds, others on pragmatic grounds. Acquaintance with first-order logic will be assumed. Prerequisite: PHIL 110 or permission of instructor. Same as PHIL 219. (Fall; not offered every year)

242. Artificial Intelligence. Philosophical, psychological, psychophysical issues. History of trends in AI and current state. Case studies from problem solving, expert systems, robotics, natural language understanding, computer vision, neural nets, and learning. LISP and possibly MATLAB programming. Laboratory exercises involve state-of-the-art hardware and software systems. This course is prerequisite for advanced AI courses. Prerequisites: MTH 150 and CSC 172. Same as BCS 232. (Spring)

244. Logical Foundations of Artificial Intelligence. An introduction to the logical foundations of AI, including first-order logic, search, knowledge representation, planning, and probability and decision theory. Prerequisites: CSC 173 and 242. (Fall)

246. Mathematical Foundations of Artificial Intelligence. The mathematical foundations of robotics and vision applications in
247. Natural Language Processing. An introduction to natural language processing: constructing computer programs that understand natural language. Topics include parsing, semantic analysis, and knowledge representation. Prerequisite: CSC 242. Same as BCS 235, LIN 247. (Fall; may not be offered every year.)

248. Speech Recognition and Statistical Language Models. Introduction to automatic speech recognition techniques starting from scratch, covering acoustics, human speech perception, signal processing, pattern recognition, and hidden Markov models. Introduction to statistical language models for use in speech recognition systems and natural language processing. Prerequisites: CSC 172 and either CSC 240 or CSC 242. Same as BCS 233, LIN 248. (Fall; may not be offered every year)

249. Sensory Motor Systems. An introduction to computer vision, including model-based vision, projective invariance, hough transforms, pattern recognition and neural nets, color theory, texture, and optic flow. Prerequisites: MTH 161 and CSC 242. Same as BCS 236. (Spring; may not be offered every year)

252. Computer Organization. Introduction to computer architecture and the layering of hardware/software systems. Topics include instruction set design, logical building blocks, computer arithmetic, processor organization, the memory hierarchy (registers, caches, main memory, and secondary storage); I/O—buses, devices, and interrupts; microcode and assembly language; virtual machines; the roles of the assembler, linker, compiler, and operating system; technological trends and the future of computing hardware. Several programming assignments required. Prerequisites: MTH 150 and CSC 172. (Spring)

254. Programming Language Design and Implementation. Design and implementation of programming languages, with an emphasis on imperative languages and on implementation tradeoffs. In-depth examination of "how programming languages work." Topics include fundamental language concepts (names, values, types, abstraction, control flow); compilation and interpretation (syntactic and semantic analysis, code generation and optimization); major language paradigms (imperative, object-oriented, functional, logic-based, concurrent). Course projects include assignments in several languages and the modification and enhancement of a working compiler. Prerequisite: CSC 173; CSC 252 recommended. (Fall)

255/455. Advanced Programming Systems. With the increasing diversity and complexity of computers and their applications, the development of efficient, reliable software has become increasingly dependent on automatic support from compilers and other program analysis and translation tools. This course covers principal topics in understanding and transforming programs at the assembly, function, and program levels. Specific techniques for imperative languages include data flow, dependence, and inter-procedural analyses; resource allocation; and program transformation for locality and parallelism. The course also touches on theoretical issues in program semantics for higher order languages. Course projects include a program analyzer and optimizer for a subset of the C-programming language. Prerequisite: CSC 254; CSC 252 recommended. (Spring)

256. Operating Systems. Principles of operating system design, explored within the practical context of traditional, embedded, distributed, and real-time operating systems. Topics include device management, process management, scheduling, synchronization principles, memory management and virtual memory, file management and remote files, protection and security, fault tolerance, networks, and distributed computing. Prerequisite: CSC 252. (Fall)


258. Parallel and Distributed Systems. This course focuses on the principles of parallel and distributed systems, and the associated implementation and performance issues. Programming interfaces to parallel and distributed computing, memory management techniques, and parallel program optimization. Interprocess communication, synchronization, and consistency models. Fault tolerance and reliability. Distributed process management, multiprocessor architectures, and the interaction of the compiler, run-time, and hardware architecture. Prerequisites: CSC 254, 256, and consent of instructor. (Fall or Spring; may not be offered every year)

280. Computer Models and Limitations. This course studies fundamental computer models and their computational limitations. Finite-state machines and pumping lemmas, the Chomsky hierarchy, Turing machines and algorithmic universality, noncomputability and undecidability, tradeoffs between power and formal tractability. Prerequisite: CSC 173. (Spring)

282. Design and Analysis of Efficient Algorithms. How does one design programs and ascertain their efficiency? Divide-and-conquer techniques, string processing, graph algorithms, mathematical algorithms. Advanced data structures such as balanced tree schemes. Introduction to NP-completeness and intractable combinatorial search, optimization, and decision problems. Prerequisites: CSC 172. (Fall)

284. Parallel Algorithms. This course studies the key techniques for designing parallel algorithms. Prerequisite: CSC 282. (Spring)

286. Computational Complexity. This course studies the difference between computable and uncomputable problems, and, especially, studies the difference between feasible and infeasible problems. Regarding the latter pair, what properties of a problem make it computationally simple? What properties of a problem may preclude its having efficient algorithms? How computationally hard are problems? Complete sets and low information content; P=NP; unambiguous computation, one-way functions, and cryptography; reductions relating the complexity of problems; complexity classes and hierarchies. Prerequisite: CSC 280; CSC 282 is a co-requisite. (Fall)

287. Randomized, Parallel, and Other Advanced Modes of Computation. Probabilistic algorithms and complexity classes. Algorithmic randomness. Circuit complexity. Resource tradeoffs. Computation trees and counting-based computation. Prerequisite: CSC 286. (Spring or Fall; may not be offered every year)

290. Topics in Computer Science. Special topics of current interest. Possibilities include building a robot, computer graphics, visual computing, software engineering, speech understanding, virtual reality. Prerequisite: varies with topic. (Fall and/or Spring)

SPECIAL COURSES

390. Supervised Teaching.

391. Independent Study. Special work arranged individually with a faculty member.

391H. Honors Independent Study. Special work arranged individually with a faculty member for completion of the honors research B.S.

393. Senior Project. A one-semester senior project for computer science majors. Each project is arranged individually with a faculty advisor.

393H. Senior Project. A one-semester senior project for computer science majors completing the honors research B.S. Each project is arranged individually with a faculty advisor.

394. Internship.

395. Research in Computer Science. Special problems may be arranged for advanced students to do individual research. Requires consent of the department.

395H. Honors Thesis Writing. Usually the final course in an honors research program, this course gives credit for experimental and scholarly research, writing, revision, and the oral defense of a senior thesis.
DANCE

The Program of Movement and Dance at the University of Rochester is committed to offering theoretical and experiential study that honors and informs the whole student. It emphasizes the creative process, contemplative practice, the nature of community, diversity, somatic education, and an appreciation of diverse ways of thinking and moving. It explores the use of movement and dance as ritual, as spiritual practice, and as community-building, drawing from traditions and philosophies from all over the world.

We encourage students to validate their conceptual understanding through their own experience. This is called embodying knowledge, engaging ideas with the tools of our own experience. This is a crucial component of education—giving each individual the opportunity to find a personal connection and resonance with intellectual material. When this happens, information is received and retained on a deeper level, and “academic” material can be taken beyond the classroom and applied to everyday life. This is the essence of much of the work in the classes: to use all the aspects of our study to attain a deeper understanding of ourselves and to enrich our experience of living embodied lives.

The Program offers a diverse set of courses that are carefully woven together to provide the students with diverse models of experiential learning and ways of thinking. The courses simultaneously emphasize sharing, cooperation, and self-reliance. Students are encouraged to be open and respect their immediate experience as a significant aspect of the educational process, and to tap into the resources they have: intellectual, emotional, artistic, intuitive, spiritual, and pragmatic. We lay the groundwork for them to become confident, articulate, highly creative, and compassionate leaders.

The program also sponsors the Performing Artist Series, which features lectures and demonstrations, workshops, and performances by internationally acclaimed artists and educators who share their passion for the arts with the University and the surrounding community. Students are given an opportunity to interact with the guest artists and understand the issues that concern them. The focus of the series is to encourage discussion, stimulate the imagination, and provide bridges between artistic and other disciplines, and to foster a learning environment composed of students, faculty, staff, and community.

Together, the academic and co-curricular components of the Program of Movement and Dance give a foundation for ongoing learning and creative responsiveness throughout a student’s life.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

102. Fundamentals of Movement. Credit—2 hours. This is the course to start with if you have never taken a dance class before. It explores movement through technique and improvisation. It emphasizes spontaneity, joy in moving, and self-awareness and is based on the fundamental movement patterns of skipping, walking, running, leaping, etc. With its focus on centering and coordination, it provides a strong foundation for further study in dance, theater, or sports. No previous dance training is required


113. Sacred Dance and Yoga. Credit—2 hours. Many of us experience dance as a form of socializing or a form of artistic expression. This course takes yet another perspective: a way of communicating with our innermost self as well as a way of celebrating the feminine principle and the rhythms of nature, of the seasons, and of our lives. Sacred dance is both ancient and current. Students explore many of the traditions of sacred dance of the world over. Included in the warm-up is hatha yoga with its similar emphasis on union of body, mind, and heart. Examples of dances explored are East Indian and Egyptian folk dances, ancient hula, African healing dance, and improvisation. Also included in the class is time for centering exercises, contemplation, and discussion. Class requirements include journaling, one three-to-five page paper, and a presentation.

114. Introduction to Yoga. Credit—2 hours. This hatha yoga course offers students an opportunity to open and strengthen the body, steady the mind, and refresh the spirit. Students are taught universal principles of alignment and balanced action with an attitude of self-respect, acceptance, and fun. Fundamentals of movement are woven among classical postures thereby providing a harmony of stillness with motion. Course requirements include home practice of asanas (poses), readings on hatha yoga and yogic philosophy, journaling, midterm exam, group presentation, and attendance at specific dance events.

120. Introduction to Aikido. Credit—2 hours. Aikido is a different kind of martial art. It doesn’t rely on speed or strength, but on the development of a calm mind and a relaxed body. While the techniques learned in Aikido are fascinating and effective, Aikido’s real secret is this strong, dependable mind/body state. In the class students are taught how to throw attackers effectively and almost effortlessly and how to fall safely. Aikido helps one to know oneself, to understand the rhythms of the human body, and to harness the true power of the mind and body for school, sports, dance, and all aspects of one’s life.

172. Embracing Experience. Credit—2 hours. This experiential course takes one on a variety of inward journeys. Every other week a new topic is explored, creating a rich tapestry of experience to be integrated and applied in both one’s personal life and the world around us. Mandalas, visualization and the body, breath work, craft as journey, and centering are just a few of the offerings that are explored. This course is open to all those seeking alternative pathways. The primary focus is an increased awareness and a deeper exploration of experience on an interactive, global level.

173. Moving through Words . . . Speaking through Movement. Credit—2 hours. The notion behind this course is that we think differently when we are in motion. Physical response, for example, can enhance language learning. By moving and speaking at once, students explore and develop both their movement and French vocabulary. The course is taught in French. Classes begin with a movement warm-up in which new French vocabulary is introduced. Students memorize vocabulary by attaching it to physical actions. In using improvisation and composition exercises, students have the opportunity to explore their own movements while speaking in French. To reinforce the language aspect of the course, some spontaneous writing exercises are done during each class. Students are asked to keep a journal and to take turns in handing out a vocabulary list to the rest of the class. This course is open to all. No previous background in dance or in French is required.

175. Fundamentals of Movement. Credit—2 hours. This is the course to start with if you have never taken a dance class before. It explores movement through technique and improvisation. It emphasizes spontaneity, joy in moving, and self-awareness and is based on the fundamental movement patterns of skipping, walking, running, leaping, etc. With its focus on centering and coordination, it provides a strong foundation for further study in dance, theater, or sports. No previous dance training required. (Fall and Spring)

176. Fundamentals of Movement II. Credit—2 hours. A continuation of DAN 175.

180. Creative Middle Eastern Dance. Credit—2 hours. Unveils the grace and beauty residing in the creative nature of Middle Eastern dance. Improves strength, flexibility, and self-awareness of the body. Class work includes meditative movement, dance technique, improvisation, and rhythm identification through music and drumming. Specific dance forms such as Egyptian and Turkish Oriental, Tunisian, American Tribal, and Folkloric/Bedouin styles of North Africa are taught. Dis-course and research topics explore issues of gender, body image, historical perspectives, and Orientalism.

185. Tap Dance: Making Music and Motion. Credit—2 hours. This course allows students to experience and study the fascinating art of tap dancing. Coursework includes
basic tap vocabulary and technique, along with improvisational exercises and assignments. An overview of tap history from its roots in percussive folk dancing to its heyday in Vaudeville is presented through visual and written materials to deepen students’ appreciation and understanding of this dance form. No previous dance experience required.

202. Contact Improvisation I. Credit—2 hours. Contact improvisation is rooted in dance, the martial arts and studies of body development, and awareness. It is a duet form where partners use weight, momentum, and inertia to move each other freely through space, finding support through skeletal structure rather than muscular effort. We explore solo and duet skills such as rolling, falling, balance, counterbalance, jumping, weight sharing, spirals, and attuning to sensory input. Skill work is combined with more open dancing in a supportive and focused environment. No previous dance training required.

203. Contact Improvisation II. Credit—2 hours. A continuation of DAN 202 that is taught concurrently with the introductory course. Students in DAN 203 gain a deeper experiential and intellectual knowledge of contact by exploring issues further. Work includes both more advanced practices with other 203 students, and the experience of helping teach the 202 students the basic principles of contact.

204. Contact Improvisation and Culture. This course includes the studio work of the 2-credit contact improvisation course, and readings and written assignments that use ideas from contact improvisation to explore cultural issues.

208. T’ai Chi and Chinese Thought. Credit—2 hours. A study of Taijiquan (also known as “Tai Chi Ch’uan” or “T’ai Chi”), a traditional Chinese martial art and its intimate relationship to the cosmological, physiological, and philosophical conceptions found in the culture and thought from which it emerged. The course investigates both the traditional Chinese philosophy and movement aspects of T’ai Chi in order to better understand the integration of human body, mind, and spirit. Additionally, this course examines the areas of internal energy, time, space, body awareness, breathing, the mechanics and psychology of martial arts, and the relationship with Qi Gong. The Simplified 24-Step Taijiquan (Ershi Shi Taijiquan) is learned along with the foundation skills of the Eight Methods or Energies (Ba Fa), Reeling Silk (Chan Si Gong), Pushing Hands (Tui Shou), and Standing Pole meditation (Zhan Zhuang).

209. Qi Gong and Chinese Thought. Credit—2 hours. Qi Gong is a traditional Chinese internal art and an early forerunner of T’ai Chi Ch’uan consisting of the practice or Gong, of sets of energy, Qi, and exercises to build outer and inner strength. It is a self-healing modality designed to balance and harmonize the longevity. This course is a study of both the philosophical and the movement aspects of Qi Gong in order to better understand and to attain the integration of body, mind, and spirit. Topics include traditional Chinese cultural concepts such as Yin-Yang theory, Five Element theory, Qi theory, and methods utilizing relaxation, posture, meditation, concentration, movement, and breathing.

211. Explorations in Qi and Culture. Dancers, philosophers, poets, warriors, healers, and artists of every discipline historically have utilized the Chinese internal arts of T’ai Chi and Qi Gong as tools for the mobilization of Qi, or energy, in order to achieve health, healing, and mind-body-spirit integration. This course combines movement, meditative, and breathing exercises and traditional forms with readings, video viewings, and discussions of literature and philosophy to explore how the practice and philosophy of these transformative arts can lead to mental and physical balance, body-mind integration, self-discovery, creative expression, and peak performance. Students complete creative exercises and exploratory projects.

214. Community, Earth, and Body. What is a sustainable community? How does our relationship with our body affect the way we interact with the world? What does it mean to be truly human and to renew and deepen communication with our natural world and society? What is transformative learning? These questions and others are addressed through experiential practice, journal writing, reading and discussion of contemporary writers, and time spent in meditation/reflection.

215. Honoring All Life. Change your perception—change your world. This course is a perceptual shift that takes us from our traditional mechanistic way of perceiving to a systems-based perception. In coming to the realization that we are damaging the earth and in the process, our own bodies and spirits, we have the opportunity to redefine who we are, what we stand for, and how we want to live. This course explores the tools necessary for planetary and personal transformation.

216. Yoga and Experiential Anatomy. Credit—2 hours. This course explores the anatomical systems of the human body through the practice of yoga asanas (postures). Delving experientially into bones, muscles, organs, nervous system, fluid, and connective tissues brings a deeper awareness, refinement, and clarity to the exploration of the yoga asanas as well as to daily functional movement and other movement practices. Students discover that the asanas become an expression of our internal experience rather than a form imposed upon the body. Awareness of one’s own living anatomy offers support for movement and opens up rich and subtle possibilities for self-expression. A variety of approaches to learning are used including movement, discussion, journaling, reading, coloring anatomical drawings and individual and partner hands-on work. The Anatomy Coloring Book by Kapit and Elson is used in this course.

217. Body as Medium: Performance Art. Credit—2 hours. This class introduces students to performance art as a four-fold discipline: as a historical and contemporary practice, as a powerful means of personal expression, and as a path toward ecological wellness. Much confusion surrounds performance art, partly because it is difficult to institutionalize. After all, many cannot decide whether performance art constitutes theater, dance, visual art, or physical exercise. And since it can pass as potentially all or none of the above, performance art remains a powerful avenue of interdisciplinary inquiry. Students, presented with daily warm-up, group, and individual exercises, learn to develop collaborative and individual pieces that explore embodiment as artistic medium. Key elements covered in the class are body as artistic medium; embodied history; alternative philosophies of the body; and the body politic vs. the political body.

218. Dance and Community. Credit—2 hours. Dance has played a part in communities for centuries. The relationship between dance and community from various perspectives and from around the globe is examined through readings and film. Students explore the meaning of community while creating a group performance piece together, which revolves around themes of social awareness and active citizenship. Whether the function of dance is recreation, courtship, social change, performance, or appealing to supernatural forces, this course offers a wide-ranging examination of dance’s role in many settings.

220. An Onscreen Tour of Dance. Credit—2 hours. In this course students embark on a journey through dance traditions around the world, examining dance as a fundamental expression of human existence, identity, and culture. Coursework consists of in-class screenings, discussion, viewing assignments, short writing assignments, and two essays. Open to all students.

225. Embracing Experience. Credit—2 hours. This experiential course takes students on a variety of inward journeys. Every other week a new topic is explored, creating a rich tapestry of experience to be integrated and applied in both our personal lives and the world around us. Mandalas, visualization and the body, breath work, and craft as journey and centering are just a few of the offerings to be explored. This course is open to all those seeking alternative pathways. The primary focus is an increased awareness and a deeper exploration of experience on an interactive, global level.

226. Embracing Experience II. Credit—2 hours. This course includes the work of DAN 225 coupled with additional reading, written assignments, and a final project.

265. Contemporary Dance Technique. Credit—2 hours. This course is designed for both students with dance experience and those who simply want to explore their movement potential in a guided, dynamic way. Students learn alignment principles, modern
dance technique, and movement phrases. A variety of exercises are taught in floor work, center, and traveling through space, as well as creative work—all of which serve as invitations to a deeper experience of body awareness and joyful, aesthetic expression. The class also includes selected readings, videos, and journaling.

266. Contemporary Dance Technique. Credit—2 hours. This course is a continuation of DAN 265 and it is taught concurrently with the introductory course, with a 20-minute extra studio time. Students in DAN 266 deepen and refine the technique learned in the previous semester. The extra class time is dedicated to learning more advanced movement phrases. The focus is on performance and on the making of a short dance piece to be presented during the class showing. Students also gain a deeper intellectual understanding of the work of some contemporary choreographers through video viewing and reading.

270. Capoeira: Brazilian Art Movement. Credit—2 hours. An art form of self-defense with strong aerobic and dance elements that brings together a harmony of forces. Through the study of the history, movements, and culture behind Capoeira, students gain self-confidence, power, flexibility, endurance, and ultimately the tools towards self-discovery. Capoeira is within the reach of anyone regardless of age, sex, or athletic experience. In keeping with its strong traditions, Capoeira balances the body, mind, and soul and enables one to break through limits, revitalizing oneself for everyday life.

280. West African Dance. Credit—2 hours. The objective of the course is to give students an experience in West African dance. Students both dance and research the historical development of performing and cultural arts in post-colonial Ghana and Guinea. These cultural practices stem from a rich history pertaining to environment, identity, and cross-cultural perspectives. Aesthetic qualities of African dance are explored through video, readings, and performance. This course culminates in a final departmental showing that is choreographed during class.

281. Dance, Culture, and Ethnicity. Credit—2 hours. Political boundaries may have divided ethnic families, but the people remain unified by their cultural heritage. In West Africa, the cultural practices of dance and drum are ritually performed with specific purpose and context. Students examine the function of dance and drum in West African society, the role that gender plays in participation, and the conversation between the dance, the drum, and the spirit. The final project is a class rite of passage that will be constructed by the class participants. Using the tools of guided visualization, journaling, and improvisation, students identify personal motivations for initiation and contribute to the final ritual presentation.

342. Creative Improvisation through World Percussion. Credit—2 hours. Explores improvisation as a process and vehicle for personal expression while investigating some of the rhythms and musics of the world through hands-on performance, guided listening, games, and video presentations. The course includes an introduction to drumming techniques with an emphasis on West African and Afro-Cuban percussion traditions. Following the spirit of these traditions, which celebrate community over individualism, practical facility with drumming language is emphasized as a key to improvisation.

EARTH AND ENVIRONMENTAL SCIENCES

Asish R. Basu, Ph.D. (California, Davis) Professor of Geology
Cynthia J. Ebinger, Ph.D. (M.I.T.) Professor of Geology; Acting Chair
Udo Fehn, Ph.D. (Munich) Professor of Geology
Gautam Mitra, Ph.D. (Johns Hopkins) Professor of Geology
Robert J. Poreda, Ph.D. (California, San Diego) Professor of Geology
John A. Tarduno, Ph.D. (Stanford) Professor of Geophysics; Chair of the Department
Carmala Garzione, Ph.D. (Arizona) Associate Professor of Geology
William Chaisson, Ph.D. (Massachusetts, Amherst) Adjunct Assistant Professor of Geology
Lawrence W. Lundgren, Jr., Ph.D. (Yale) Professor Emeritus of Geology
Robert G. Sutton, Ph.D. (Johns Hopkins) Professor Emeritus of Geology

The Department of Earth and Environmental Sciences offers five distinctive degree programs and provides its students with excellent opportunities for communicating and working with its faculty members and graduate students, both in and outside of the classroom. Each of the degree programs has been designed to serve special interests of the students and the particular demands associated with professional work in various areas of the earth sciences.

The degree programs consist of the B.A. in geological sciences, the B.S. in geological sciences with concentrations in geology, geochemistry or geobiology, the B.S. in geomechanics (GEM), the B.A. in environmental studies, and the B.S. in environmental sciences. A concentration in Planetary Geology and Geophysics is under review for 2008. The three B.S. programs are designed to give students the background for graduate work and professional careers in the earth and environmental sciences, and in those areas in which the earth sciences overlap with the life sciences or with engineering. The two B.A. programs are designed to allow more flexibility in program design and are pursued not only by students preparing for graduate work in the earth sciences but also by students interested in law, management, and teaching. These students commonly carry double majors, such as geological sciences and economics. The department also offers minors in geological sciences and environmental geology.

The department considers field experience to be a valuable part of geological training and incorporates field trips into the regular schedule of many of the undergraduate courses. Students take excursions within New York and adjoining states. Special courses provide field experience studying active geological processes in California.

Academic staff encourage advanced undergraduates to participate in North American and overseas field research programs. Most undergraduates participate in active laboratory research including geophysics, geochemistry, paleontology, petrology, structural geology, tectonics, seismology, stratigraphy, geodynamics, magneto-stratigraphy, geology, public policy, paleoclimate studies, and environmental geology.

The Undergraduate Student Geological Organization (USGO) is an active student-led organization that provides special field trips, speakers from other universities and colleges, and social events throughout the academic year.

Graduate work and careers in most fields demand a broad general background in the basic sciences and mathematics, and students are strongly advised to take courses beyond the minimum requirements in these subjects. All students are encouraged to gain a proficiency in reading scientific material written in foreign languages.

At least two courses are required to fulfill the department’s upper-level writing requirement. A list of courses and a description of the requirement can be found in the Earth and Environmental Sciences’ Upper-Level Writing Requirement document (see Kathy Lutz in 227 Hutchison Hall or contact her at Kathy@earth.rochester.edu for a copy).

COURSE STRUCTURE

Each of the five courses and the suggested paths or tracks are outlined below.

MINIMUM REQUIREMENTS FOR THE B.A. PROGRAM IN GEOLOGICAL SCIENCES

Required Courses
- MTH 161 or MTH 141–142 (calculus AP credit is acceptable)
- PHY 121 (physics AP credit is acceptable)
- CHM 131 (chemistry AP credit is acceptable)
• One other course in related sciences (mathematics, physics, chemistry, biology, or statistics)

Geology Core Courses
• EES 101. Introduction to Physical Geology
• EES 201. Evolution of the Earth
• EES 203. Sedimentology and Stratigraphy
• EES 204. Mineralogy
• EES 208. Structural Geology

Technical Electives
Three technical electives should be chosen to create what the student and faculty advisor(s) view as a coherent program. Any EES courses at the 200 level or higher are acceptable. One 100-level EES course may be acceptable if it was taken in the first year.

MINIMUM REQUIREMENTS FOR THE B.S. PROGRAM IN GEOLOGICAL SCIENCES

Required Courses
• MTH 161, 162, 163, or MTH 141–143, 163 (calculus AP credit is acceptable)
• PHY 112 (113 for geobiology track) (physics AP credit is acceptable)
• PHY 112 (114 for geobiology track) (physics AP credit is acceptable)
• CHM 131 (chemistry AP credit is acceptable)
• CHM 132 (chemistry AP credit is acceptable)

Geology Core Courses
• EES 101. Introduction to Physical Geology
• EES 201. Evolution of the Earth
• EES 203. Sedimentology and Stratigraphy
• EES 204. Mineralogy
• EES 208. Structural Geology

Field Course
This requirement may be satisfied by participating in a 6–8 week summer field course in geology, or by undertaking supervised field-work (EES 299) with approval of the advisor.

Technical Electives
Four technical electives in EES should be chosen to create what the student and the faculty advisor(s) view as a coherent program that builds to an advanced understanding of the earth sciences. One 100-level EES course may be acceptable if it was taken in the first year. Technical electives should be courses distinct from required courses in the track.

Senior Thesis
In addition to the above courses, students are encouraged to undertake a research project culminating in a thesis written in the senior year (EES 393).

GEOCHEMISTRY TRACK

Required Courses
• EES 206. Petrology
• Two courses in geochemistry chosen from the following:
  - EES 209. Geochemistry
  - EES 217. Physical and Chemical Hydrology
  - EES 218. Chemistry of Global Change
  - EES 248. High Temperature Geochemistry

Technical Electives
Three technical electives in EES or CHM should be chosen to create what the student and the faculty advisor(s) view as a coherent program that builds to an advanced understanding of the earth sciences. One 100-level EES course may be acceptable if it was taken in the first year. Technical electives should be courses distinct from required courses in the track.

Senior Thesis
In addition to the above courses, students are encouraged to undertake a research project culminating in a thesis written in the senior year (EES 393).

GEOBIOLOGY TRACK

Required Courses
• BIO 110. Principles of Biology I (biology AP credit is acceptable)
• BIO 111. Principles of Biology II
• STT 212. Applied Statistics for the Biological and Physical Sciences I or II
• BIO 276. Statistics for Biologists
• EES 207. Invertebrate Paleontology

Field Course
This requirement may be satisfied by participating in a 6–8 week summer field course in geology, or by undertaking supervised field-work (EES 299) with approval of the advisor.

Technical Electives
Two technical electives in EES or BIO should be chosen to create what the student and the faculty advisor(s) view as a coherent program that builds to an advanced understanding of the earth sciences. One 100-level EES course may be acceptable if it was taken in the first year. Technical electives should be courses distinct from required courses in the track.

Senior Thesis
In addition to the above courses, students are encouraged to undertake a research project culminating in a thesis written in the senior year (EES 393).

ADVISING COMMITTEE
FOR ENVIRONMENTAL DEGREES
Udo Fehn, Ph.D. (Munich) Professor of Chemistry
John S. Muentter, Ph.D. (Stanford) Professor of Geology
Robert J. Poreda, Ph.D. (California, San Diego) Professor of Geology
Lawrence S. Rothenberg, Ph.D. (Stanford) Professor of Political Science
John H. Werren, Ph.D. (Utah) Professor of Biology
Michael Wolkoff, Ph.D. (Michigan) Senior Lecturer in Economics

REQUIREMENTS FOR THE B.S. IN ENVIRONMENTAL SCIENCE

The B.S. in environmental science provides a broad basis in the natural sciences and their applications to processes and problems in the environment. This degree is intended for students who are interested in a career in environmental research. Students going through this program will be able either to seek employment directly or to go to programs that offer advanced degrees in environmental science.

Basic Courses
• BIO 110, 111
• CHM 131, 132, 203, and 207
• EES 101
• MTH 161, 162 (or 141–143), and 163 or 165
• PHY 113/121, 114/122

Core Courses
• EES 103, 215, 217, and 218

EGY TRACK

Required Courses
• EES 101
• CHM 131

Technical Electives
Three technical electives in EES or CHM should be chosen to create what the student and the faculty advisor(s) view as a coherent program that builds to an advanced understanding of the earth sciences. One 100-level EES course may be acceptable if it was taken in the first year. Technical electives should be courses distinct from required courses in the track.

Senior Thesis
In addition to the above courses, students are encouraged to undertake a research project culminating in a thesis written in the senior year (EES 393).
Technical Electives
Three technical electives are required, chosen from tracks in biology, chemistry, or geology. Courses in this category are selected from a list of approved courses by the student in consultation with a faculty advisor. The program is completed with two closure courses (8 credit hours), which consist either of a senior thesis or a combination of internship, practicum, and seminar in the environmental sciences.

REQUIREMENTS FOR THE B.A. IN ENVIRONMENTAL STUDIES
The B.A. in environmental studies combines courses necessary for the basic understanding of processes in the environment with courses dealing with theories of economics and political science. This program is intended for students who are interested in the economic and political consequences of problems in the environment. Students who complete this program typically go into fields such as environmental law or public policy.

Basic Courses
• BIO 110 or 111
• CHM 131
• EES 101
• MTH 161 (or 141 and 142)

Core Courses
• EES 103, 215, 217 or 218

Elective Courses
Elective courses come from two groups: natural sciences and social sciences. A total of seven elective courses is required (three or four from either group), to be chosen from a list of approved courses by the student in consultation with a faculty advisor. In addition, one course in statistics, mathematics, or computer science is required. The program is completed with a closure course that will be either a senior thesis, internship, or suitable seminar.

B.S. IN GEOMECHANICS
A four-year program in geomechanics is offered jointly with the Department of Mechanical Engineering for students interested in the application of the field of mechanics to problems associated with the atmosphere, rivers, lakes and oceans, and the solid earth. Students successful in this program will be well equipped for graduate work in a variety of fields, including geophysics, hydrology, structural geology and rock mechanics, engineering geology, limnology, and coastal and marine geology. (See also a description of the program in the section on Interdisciplinary Programs, School of Engineering and Applied Sciences.)

REQUIREMENTS
• MTH 161, 162 (or 141–143), 163, and 164
• PHY 121, 122, 123
• CHM 131

• EES 101, 201, 204, and 208
• ME 120, 123, 225, 226, and either 241 or 242

In addition to the above courses, there are four technical electives, which may be any of the EES or ME courses at the 200 level or higher, and one technical elective from any discipline, as agreed upon with the faculty advisor. The program includes three free electives to allow a strong minor in an area of particular interest to the student, or to broaden the scope of the curriculum.

REQUIREMENTS FOR A MINOR IN GEOLOGICAL SCIENCES
Six courses are required:
• EES 101. Introduction to Physical Geology
• EES 214. Structural Geology
• EES 215. Environmental Geophysics
• Three from the following list:
  • EES 204. Mineralogy
  • EES 205. Introduction to Geophysics
  • EES 207. Principles of Paleontology
  • EES 208. Structural Geology
  • EES 211. Earthquake and Volcanic Hazards: Living on an Active Planet
  • EES 217. Physical and Chemical Hydrology
  • EES 218. Chemistry of Global Change
  • EES 219. Energy and Mineral Resources

A student taking this minor would have a broad grasp of geology and would be able to build upon it as a solid foundation for a major should his or her career plans change.

REQUIREMENTS FOR A MINOR IN ENVIRONMENTAL GEOLGY
Six courses are required (three specified and three electives).

• Specified:
  • EES 101. Introduction to Physical Geology
  • EES 201. Evolution of the Earth
  • EES 204. Mineralogy

• Choose three courses from the following list:
  • EES 201. Evolution of the Earth
  • EES 203. Sedimentology and Stratigraphy
  • EES 204. Mineralogy
  • EES 208. Structural Geology
  • EES 217. Physical and Chemical Hydrology
  • EES 218. Chemistry of Global Change

The environmental geology minor is intended especially for natural-science and social-science concentrators who are planning on further study or employment in environmental fields.

UPPER-LEVEL WRITING REQUIREMENT
At least two courses are required to fulfill the department’s upper-level writing requirement. A list of courses and a description of the requirement can be found in the Earth and Environmental Sciences’ Upper-Level Writing Requirement document (see Kathy Lutz in 227 Hutchison Hall or contact her at Kathy@earth.rochester.edu for a copy).

SPECIAL NOTE ON COURSE NUMBERING
Courses offered by the Department of Earth and Environmental Sciences include several subdisciplines, representing a wide range of earth science study. To represent these subdisciplines, a special system of course numbering has been employed, as outlined below. Higher numbers are more advanced courses only within a given subdiscipline.

10x Introductory courses without prerequisites
20x Introductory courses in geology (with EES 101 as prerequisite)
21x Introductory courses in environmental sciences (with EES 101 as prerequisite)
22x Courses in hydrology and related fields
24x Courses in petrology
25x Courses in marine geology, geophysics, and related fields
26x Courses in geochemistry
27x Courses in paleontology
28x Courses in structure and tectonics
29x Field courses

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

100S. Oceanography. This course introduces students to the basics of marine geology, and physical, chemical, and biological oceanography. Also examined are coastal environments, limnology (the study of lakes), and satellite oceanography. The session ends with an introduction to oceanographic institutions, research and education programs, and ships. Field trips include a visit to the Lake Ontario coastal environments and a day on a research vessel on Seneca Lake. (Summer)

101. Introduction to Physical Geology. This introductory geology class provides a broad overview of the earth sciences, from planetary evolution to the interplay of geology and climate. The course is a prerequisite for all undergraduate majors who are considering careers in the earth and environmental sciences, while also satisfying science requirements for other undergraduate majors. A basic introduction to geological processes is supplemented with an emphasis on marine geology and plate tectonics. A voluntary field trip to the Adirondack Mountains and other field opportunities are available for course participants. The course also aims to provide students with a geological background with which they can better evaluate current environmental issues, including potential global warming. (Fall)

102Q. Earthquakes, Volcanoes, and Mountain Ranges in California: A Field Quest. Understanding how the Earth works starts with an appreciation of geological processes in action. To observe these dynamic processes, Earth scientists must travel to areas of geological youth, such as California. In this Quest, students are introduced to active geol-
ogy through readings and discussion sections in preparation for a field excursion to California. During the excursion students learn how to examine critically ideas on how Earth science systems work and how active processes affect society. Prerequisite: EES 101 or permission of instructor. (Spring)

103. Introduction to Environmental Science. An introduction to the natural, physical, chemical, biological, and geological processes that shape conditions at the Earth's surface, their interrelationships, and the modification of these processes by human activity. Students learn to critically analyze scientific hypotheses and the data on which they are formed. Exercises in the field and laboratory reinforce basic concepts introduced in the lecture, and introduce students to some basic methods of environmental research. The content of this course is similar to that of the AP Environmental Science curriculum. (Spring) 103aQ. Environmental Quest in the Field and Laboratory. In this quest, small groups of students (about 4 per group; maximum of 12) conduct an environmental investigation of an actual field site in the Rochester area. Through a series of experiments involving field mapping, sampling, laboratory analysis, and data interpretation, students attempt to achieve an understanding of a specific environmental problem. The coordination of the laboratory experiments allows students to build on skills learned in previous sessions and to recognize the linkages among a variety of investigative approaches. The semester culminates with the presentation of the results in a departmental forum.

106. Meteors and Impact Craters. An introduction to the geology of the solar system from the perspectives of earth science and the fascinating world of meteorites, asteroids, comets, and impact craters. Special emphasis is on the meteorite evidence for our understanding of planetary formation, the role of impacts and mass extinctions, and the origin of the moon.

111. Earthquake and Volcanic Hazards: Living on an Active Planet. Earthquakes and volcanic eruptions are violent manifestations of plate tectonics, the movement of the relatively rigid plates forming the Earth's outer shell. This course focuses on the causative mechanisms of earthquakes and volcanoes, hazard mitigation and forecasting, and insights into planetary processes gained from their study. The final third of the course examines particular events on Earth, with implications for planetary evolution in general. Students electing EES 211 extend the case study report and oral presentation. Prerequisite: EES 101 or permission of instructor. (Spring)

210. Analytical Methods in Geochemistry. A laboratory-based, hands-on introduction to selected analytical methods commonly employed in the study of geological and environmental materials. Students apply these methods to a variety of geological and environmental materials. Students are required to complete laboratory exercises as well as a term project to be agreed upon with the instructor. Prerequisite: permission of instructor.

211. Earthquake and Volcanic Hazards: Living on an Active Planet. Earthquakes and volcanic eruptions are violent manifestations of plate tectonics, the movement of the relatively rigid plates forming the Earth's outer shell. This course focuses on the causative mechanisms of earthquakes and volcanoes, hazard mitigation and forecasting, and insights into planetary processes gained from their study. The final third of the course examines particular events on Earth, with implications for planetary evolution in general. Students electing EES 211 extend the case study report and oral presentation. Prerequisite: EES 101 or permission of instructor. (Spring)

214. Environmental Geophysics. Dynamics of the crust: earthquakes and propagation of seismic waves, magnetic field, paleomagnetism, heat generation and heat flow, plate tectonics, and convection in the earth. Prerequisite: EES 101 or permission of instructor. (Spring)

209. Geochemistry. Solar system chemistry; mineralogic, chemical, and isotopic compositions of meteorites. Earth's structure and mineral composition, partial melting, and fractional crystallization models; isotopic heterogeneity of the mantle and composition of oceanic and continental crust. Relative abundances of major sedimentary rocks and mass balance; trace elements in sandstones and limestones; iron formations, element partitioning between river-suspended particles and river water, and the adsorption model. Distribution, concentration, and speciation of elements in the ocean; marine sediments, manganese nodules, and seamount crusts. Hydrothermal vents of the mid-ocean ranges. Prerequisite: EES 204. (Spring)

204. Mineralogy. Lectures discuss the physical and chemical principles governing the properties and formation of minerals. There are three major divisions of the subject matter: (a) geometric crystallography; (b) crystal chemistry and properties of minerals, and (c) occurrence, origins, and temperature-stability of the major rock-forming minerals. Laboratories are devoted to exercises in geometric crystallography, X-ray diffraction and hand-specimen mineral identification. Prerequisite: EES 101 or permission of instructor. (Spring)

205. Geophysics. Composition of the earth, radioactivity and age of the earth, gravity field and rotation, earthquakes and propagation of seismic waves, magnetic field, paleomagnetism, heat generation and heat flow, plate tectonics, and convection in the earth. Prerequisites: MTH 143, PHY 114 or equivalent, EES 101. (Fall)

206. Petrology and Geochemistry. Description, classification, and origin of igneous and metamorphic rocks in the light of theoretical-experimental multicomponent phase equilibria studies; use of trace elements and isotopes as tracers in rock genesis; hand specimen and microscopic examinations of the major rock types. Prerequisite: EES 101.

207. Invertebrate Paleontology. This course is designed to introduce the basic principles of paleontology with a concentration on invertebrate fossils. Topics covered include taphonomy and principles of evolution as evidenced by the fossil record. Laboratory exercises and lectures also cover the classification, morphology, and evolution of major invertebrate fossil groups. Prerequisite: EES 201. (Fall)

208. Structural Geology. Recognition and interpretation of geologic structures. Topics include geometric analysis of faults, folds, joints, and rock fabrics; an introduction to stress analysis, theories of brittle failure, finite strain analysis, ductile deformation, application to geotectonics. Laboratory work concerned with structural analysis. Prerequisites: EES 101, 201, 204. (Fall)
outlines the formation of water, atmospheric processes, and the hydrologic cycle. The second part focuses on the theory of, and geometric controls on, groundwater flow. The third and final part of the course deals with natural groundwater geochemistry and environmental contamination. Prerequisite: EES 101. (Spring)

218. The Chemistry of Global Change. A quantitative survey of the processes controlling environmental conditions at the Earth’s surface today, how they have changed with time, and how they are expected to change in the future. The course emphasizes the chemical composition of the atmosphere and oceans, and the chemical, biological, and geological processes that affect this composition. Specific topics include greenhouse gases and global warming; photochemistry and stratospheric ozone; geochemical cycles and feedbacks; the effects of human activities; and the methods used to study the chemical evolution of the atmosphere and oceans through time. Prerequisites: CHM 131–132 or 151–152, MTH 162, EES 101 and 103; MTH 163 recommended. (Fall)

219. Energy and Mineral Resources. Same as EES 119, but with more emphasis on science background in separate readings and discussion section. Intended for students in sciences and engineering. (Spring)

240. Optical Mineralogy. Principles of optical crystallography and their application in the identification of rock-forming minerals, mostly the silicates, with the polarizing microscope. Prerequisite: EES 204 or permission of instructor. (Fall)

241. Igneous and Metamorphic Petrology. Lectures cover an overview of igneous and metamorphic petrology. Origin and distribution of the major igneous metamorphic rocks in the light of experimental and theoretical multiphase equilibrium studies are the major topics of the lectures. Trace element distribution and isotopes as petrogenetic tracers in the evaluation of the crust-mantle system also are covered in the lectures. Laboratories are devoted to description, identification, and significance of mineral assemblages in these rocks as observed in hand specimens and under the petrographic microscope. Prerequisites: EES 101, 204, 240 or permission of instructor. (Spring)

248. High-Temperature Geochemistry. An introduction to the principles of geochemistry. The first portion of the course is devoted to basics, especially thermodynamics and isotope (both stable and radioactive) geochemistry. The middle portion of the course deals with high-temperature processes and crystallization. The last part of the course covers lower temperature processes including weathering, sediment diagenesis, and element cycling through the lithosphere. Prerequisites: EES 101, CHM 103. (Fall)

251. Planetary Sciences: Interiors, Surfaces, and Evolution. This course focuses on the evolution of planetary interiors within the solar system, including processes that are essential for the development and sustainability of habitable planets. Practical work includes interpretation of space imagery from the surfaces of terrestrial planets, analysis of gravity, and magnetic data. (Spring)

252. Marine Geology. This course provides a comprehensive review of modern marine geology with an emphasis on the deep sea. Areas identified by the Joint Oceanographic Institution as of high research priority are discussed, including new techniques used to study such problems. Four subject areas are discussed: the lithosphere, tectonics, ocean history and sedimentary geochemistry, and physical processes. Prerequisite: EES 101. (Spring)

253. Geodynamics. Processes that create and modify Earth and the terrestrial planets are examined using an “earth engineer” approach. Emphasis is placed on plate tectonics, with discussion of current research in mantle convection. The final third of the course focuses on active plate tectonic boundaries and evidence for plate tectonics on Mars and Venus. (Fall)

254. Geographic Information Systems: Earth Science Applications. This course provides an introduction to Geographic Information Systems, with an emphasis on their application to issues in the earth and environmental sciences. Examples of applications may include land use (and environmental contamination) and its relationship to geology, hydrology, and climate. Other applications (time permitting) include a survey of computer packages routinely used in the marine geoscience community. Prerequisite: EES 101. (Spring)

256. Paleomagnetism and Global Plate Tectonics. The basic paleomagnetic methods used to determine absolute plate motions are reviewed. Applications include the potential cause and effect relationship between changes in absolute plate motions, mantle plume volcanism, orogeny, and climate change. Prerequisite: EES 101. (Alternate Springs)

258. Hotspots and Plate Motions. The course provides a basic understanding of hotspot models, hotspot fixity, and the relationships between hotspots, mantle plumes, true polar wander, and plate motions. Hypothesis development and testing are discussed, as are the basic elements of grantsmanship. Prerequisite: EES 101 or equivalent. (Spring)

263. Seminar in Biogeochimistry. Current topics in biogeochimistry, geobiology, and astrobiology are approached through literature reviews, discussions, and student presentations. The course emphasizes geochemical methods used to study the biology and environment of the early Earth. Prerequisites: introduction to chemistry, biology, physics, and calculus. (Spring)

264. Paleoenvironmental Reconstructions Using Light Stable Isotopes. This class focuses on techniques used in environmental reconstructions to address questions related to paleoclimate, paleotemperature, paleovegetation, and paleoecology. The course examines the use of stable isotopes in paleoenvironmental reconstructions with particular emphasis on O, C, and to a lesser extent H and N isotopes. The course starts with a thorough introduction of the geological framework of the environments of interest and the processes of light isotope fractionation. This is followed by “emphasis areas” that highlight the basics and latest developments in a variety of environmental systems, including the oceans, rivers, ice, lakes, soils, and fossils. Prerequisites: EES 101 or 103. Open to juniors and seniors. (Fall)

268. Chemical and Isotopic Hydrology. An integrated approach to groundwater hydrology applying physical, chemical, isotopic, and dating data. The course is based on case studies and exercising of data processing. (Alternate Springs)

269. Stable Isotopes in Geochemistry. This course examines the distribution of the stable isotopes of hydrogen, carbon, oxygen, and nitrogen in biological sedimentary, metamorphic, and igneous processes. Prerequisites: EES 248, 467, or permission of instructor. (Spring)

270. Vertebrate Evolution. A survey of fossil records of vertebrate animals. Topics include classification of the vertebrates, introductory osteology, origin of the vertebrate classes, transition to land, origin of flight, hot-blooded/cold-blooded dinosaur controversy, hominid evolution as well as the origin and evolution of important vertebrate orders. (Fall)

271. Invertebrate Zoology. This course covers the classification of the major invertebrate organism phyla from protostands to hemichordates. Lectures, twice a week, emphasize functional and constructional morphology and evolutionary aspects; labs focus on classification and anatomy; emphasis is given to skeletonized groups with a geologic record. (Fall)

272. Advanced Principles of Paleontology. A continuation of EES 207, but with an increased emphasis on broad-scale concepts and applications of paleontology. Topics covered include principles of biostratigraphy, biogeography, paleoclimatology, and evolutionary paleontology. Seminars focus on case studies that illustrate particular principles. Course builds on fundamental knowledge of invertebrate paleontology. (Fall)

274. Seminar in Paleoceanography. Credit—2 hours. Topics of discussion include the history of deep-water formation and surface circulation, geochronology, stratigraphy, and ocean chemistry and the results from deep-sea drilling in general. Prerequisite: permission of instructor.
275. Building the Icehouse: Paleocenography and the Marine Records of Climate Change. This course examines the response of the ocean to gradual tectonic change as recorded in the marine sedimentary record. Students are introduced to fundamental principles of paleocenography, practical aspects of isolating primary geological signals from marine sediments, and the nature of interpreting these signals. The central theme of the course is the role of the oceans during the climate transition from greenhouse conditions during the Cretaceous to present “icehouse” conditions. Some topics covered include stratigraphic correlation of deep-sea cores, evolution of surface and deep circulation patterns, chemical tracers of provenance and process, major events in paleocenography.

277. Paleoecology. This course focuses upon interpretation of modes of life, interactions, and environments of ancient organisms, based on data from fossil preservation, associated sediments, functional analysis, and comparison with modern analogs. Topics include taphonomy, physical environments (particularly substrates), paleoeconomy of trace fossils, paleoecology and functional morphology, criteria for recognizing fossil communities, meaning and measurement of diversity, trophic ecology, and the evolution of marine communities through eologic time.

279. Evolutionary Paleontology. This course assumes familiarity with the concepts presented in EES 207 and takes a more in-depth look at topics such as evolutionary ecology (e.g., development of diversity, mass extinction events), evolutionary change at the organismic level (e.g., morphometric studies, cladistics and the fossil records, paleobiogeography), and also examines the interdependence of geochronological and “molecular clock” studies. The purview of the course includes microbial, invertebrate, and vertebrate groups. Prerequisite: EES 207.

283. Sedimentary Basin Analysis. By determining how sedimentary basins develop and fill, we better understand the tectonic and eustatic controls on subsidence and surficial processes. Basin classification schemes, flexural and thermal subsidence, isostasy, sequence stratigraphy, and techniques used to characterize sedimentary basin evolution are discussed. Prerequisite: EES 203.

285. Structure and Tectonics of Mountain Belts. Orogeny and its relationship to plate tectonics. Structural style and tectonic history of mountain belts with special reference to the Appalachians and Cordilleras. Homework assignments involve drawings and interpreting cross-sections through mountain belts. Field trip to the Appalachians to look at typical structures of mountain belts. Prerequisite: EES 208 or equivalent. (Spring)

286. Seminar in Sedimentology and Tectonics. Interpreting the lithofacies and chemistry of sedimentary rocks to understand paleoenvironment; impact of tectonics on climate. Topics vary each semester. Classwork will involve readings, presentations, and discussions of classic and current literature. Prerequisite: EES 101; EES 203 recommended. (Spring)


298. Introduction to Research Methods. A basic introduction to research in the earth and environmental sciences is provided in one of the laboratories that comprise the department’s Center for Analytical Geosciences.

299. Field Geology. This course covers the essential geologic and geophysical approaches to field stratigraphy, mapping, and structural interpretation. The coursework is based on observations made during a substantial field excursion (usually six weeks long). Additional credit may be earned by laboratory analysis of samples collected during the field excursion. Prerequisite: permission of instructor.

318W. Environmental Decisions. Analysis of decisions resulting in environmental change as seen from scientific perspective. The interaction of scientists with the public and with policymakers is also emphasized. A College writing course. (Spring)

319W. Energy Decisions. Investigation of the decision-making processes leading to the use of specific energy sources in developed countries, with special attention given to the United States and Germany. Review of energy sources in use today (hydrocarbons, nuclear) and potential alternatives (wind, solar); comparison of electoral systems; history of environmental movements and decision processes in the United States and Germany. Seminar course; evaluation based on oral presentations and papers. Fulfills Department of Earth and Environmental Sciences writing requirement. (Spring)

360. Environmental Geology in the Field and Laboratory. This course provides instruction in laboratory techniques used in the analysis of natural waters. The laboratory techniques are applied to the study of local environmental problems and include instruction in atomic absorption spectrophotometry; ion and gas chromatography, as well as standard “wet” chemical techniques. Prerequisites: CHM 103/104, MTH 161, EES 217. (Fall)

390. Supervised College Teaching. (Fall and Spring)

391. Independent Study in Geology. (Fall and Spring)

392. Special Topics Seminar. (Fall and Spring)

393. Senior Thesis. An individual research course for seniors who have completed the basic program of undergraduate courses required for a major. (Fall and Spring)

394. Internship. Experience in an applied setting supervised on site. Approved and overseen by a University instructor. (Fall and Spring)

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**ECONOMICS**

Mark Bils, Ph.D. (M.I.T.)  Professor of Economics; Chair of the Department
John Duggan, Ph.D. (Caltech)  Professor of Political Science and Economics
Stanley Engerman, Ph.D. (Johns Hopkins)  John Munn Professor of Economics and Professor of History
Ronald Winthrop Jones, Ph.D. (M.I.T.)  Xerox Professor of International Economics
Steven Landsburg, Ph.D. (Chicago)  Professor of Economics
Walter Y. Oi, Ph.D. (Chicago)  Professor of Economics
Charles E. Phelps, Ph.D. (Chicago)  Professor of Economics, of Political Science, and of Community and Preventive Medicine
Alan Stockman, Ph.D. (Chicago)  Marie Carran Wilson and Joseph Chamberlain Wilson Professor of Economics
William Thomson, Ph.D. (Stanford)  Professor of Economics
Mark Aguiar, Ph.D. (M.I.T.)  Associate Professor of Economics
Yoonsung Chang, Ph.D. (Rochester)  Associate Professor of Economics
Arpiad Abraham, Ph.D. (Universitat Pompeu Fabra)  Assistant Professor of Economics
Paulo Barelli, Ph.D. (Columbia)  Assistant Professor of Economics
William Hawkins, Ph.D. (M.I.T.)  Assistant Professor of Economics
Jay Hong, Ph.D. (University of Pennsylvania)  Assistant Professor of Economics
Ronni Pavan, Ph.D. (Chicago)  Assistant Professor of Economics
Uta Schienberg, Ph.D. (University College London)  Assistant Professor of Economics
Gábor Virág, Ph.D. (Princeton)  Assistant Professor of Economics
Nese Yildiz, Ph.D. (Stanford)  Assistant Professor of Economics
Joshua Kinsler, B.S. (Virginia)  Instructor in Economics
Michael Wolkoff, Ph.D. (Michigan)  Senior Lecturer in Economics; Deputy Chair of the Department
Lionel Wilfred McKenzie, Ph.D. (Princeton)  Wilson Professor Emeritus of Economics

Teaching assistants supervise recitation and homework sections of ECO 108, 207, 209, 230, and 231. Approximately one course per semester is taught by an advanced part-time graduate instructor.

The Department of Economics offers a program of study leading to the B.A. degree in economics and financial economics and, at the graduate level, to the M.A. and Ph.D. degrees. The department also offers a minor in economics as well as six different economic clusters.
The undergraduate program emphasizes the understanding of modern tools of economic analysis and their application to contemporary policy issues. Those completing an appropriate program should be adequately prepared for graduate work in economics and other professional schools. A more detailed description of the program of the Department of Economics is available from the department office, and on the Web at www.econ.rochester.edu.

**REQUIREMENTS FOR A CONCENTRATION IN ECONOMICS**
(Effective for the class of 2007 and beyond. See our Web site at www.econ.rochester.edu for the most current version of all rules.)

- One year of calculus established by the successful completion of MTH 143, 162, 172, or equivalent.
- ECO 108 (must not be taken after any 200-level economics course; students may place out of ECO 108 and substitute a 200-level economics course).
- ECO 230 (Economics Statistics). Students may substitute STT 213 or MTH/STT 203 as alternatives.
- ECO 207, 209, 230, and 231 (all completed by end of junior year).
- Four additional economics courses (200 level or above, except 594; five if ECO 108 is not taken).
- A ‘C’ average in the above economics courses.
- Two courses beyond the introductory level in an allied field, subject to approval by the faculty advisor.
- Completion of the upper-level writing requirement.

**REQUIREMENTS FOR A CONCENTRATION IN FINANCIAL ECONOMICS**
- One year of calculus
- ECO 108 (must not be taken after any 200-level economics course; students may place out of ECO 108 and substitute a 200-level economics course).
- ECO 250 (Economics Statistics). Students may substitute STT 213 or MTH/STT 203 as alternatives.
- ECO 207, 209, 230, and 231 (all completed by end of junior year).
- Three additional 200-level electives (one of which must be International Finance, Economics of Organizations, Econometrics of Financial Markets, Public Finance).
- Accounting 201.
- Accounting 221.
- MTH 210 (Introduction to Financial Mathematics). Must be taken prior to second finance course.
- Completion of the upper-level writing requirement.

**THE HONORS PROGRAM**
Students seeking an enriched curriculum can pursue a concentration with honors. The Honors Program requires additional coursework in mathematics and economics, as well as enrollment in “honors” designated courses. Honors graduates also write a research paper in Senior Seminar. For specific details on the requirements for a concentration with honors, please visit our Web site at www.econ.rochester.edu.

**CITATIONS OF ACHIEVEMENT**
Students who concentrate in economics can also earn a citation of achievement. More information is available from the department office and on the Web at www.econ.rochester.edu.

**CLUSTERS IN ECONOMICS**
Information is available at the department office as well as on the Web at www.rochester.edu/College/CCAS/clusters/.

**REQUIREMENTS FOR A MINOR IN ECONOMICS**
- ECO 207
- ECO 209
- Three additional 200-level economics courses

**UPPER-LEVEL WRITING REQUIREMENT**
Students will meet the upper-level writing requirement by taking two upper-level writing courses within the Department of Economics. For most students, one of these courses will be econometrics. The second course can be chosen from a variety of electives, denoted by the postscript “W” in the course schedule.

**SCHEDULING**
ECO 108, 207, 209, 230, and 231 are offered in fall, spring, and summer. Elective courses are generally offered not more than once each year.

**COURSES OF INSTRUCTION**
Definitive course listings are published before each semester. Course listings can also be found on the Web under Student Life, Class Schedules. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

108. **Principles of Economics.** The fundamentals of microeconomic and macroeconomic theory, with applications; preparation for subsequent economics courses. (Fall and Spring)

191Q. **The Economic Way of Thinking.** Small seminar open only to first-year students. No prior knowledge of economics is required. Students use ideas from economics to explore questions about human behavior, the role of government, the difference between right and wrong, and the nature of justice.
224. Economics of Sports and Entertainment. The markets for professional and amateur sports and entertainment are analyzed. Impacts of market organization and public policy on attendance, salaries, and profits are examined. Prerequisite: ECO 108.
225. Economic Development of the North Atlantic. This course is concerned with the economic development of Europe from the Middle Ages to the present. Primary attention is given to Western Europe, but the impact of economic changes elsewhere is also discussed. Prerequisite: ECO 108. Same as HIS 210.
227. American Economic Growth. American economic history from the colonial period to the 1980s including discussions of growth in the colonial economy, slavery in the American south, the rise of “big business,” causes of the depression in the 1930s, and the economic conditions of the period after World War II. Same as HIS 256. Prerequisite: ECO 108; ECO 207 is useful but not required.
228. Economics of Afro-American Slavery. The profitability and economic viability of the slave system and the effect of slavery on distribution of income as well as on the level and rate of growth of Southern per capita income are examined. Prerequisite: ECO 108.
230. Economic Statistics. Introduction to the probability and statistical theory underlying the estimation of parameters and testing of hypotheses in economics. Linear correlation and simple regression analysis. Students use computers to analyze economic data. The class consists of three hours of lecture and one hour of discussion. Prerequisite: students should have taken or be taking calculus. (Fall and Spring)
231. Econometrics. Regression analysis applied to time series and cross-section data, simultaneous equations; analysis of variance. Prerequisite: ECO 230, STT 213, or MTH 203. (Fall and Spring)
232. Econometrics of Financial Markets. Many results in the theory of finance rely on the fact that the time series representing financial data follows certain principles. In this course we analyze data in order to decide whether the standard models apply or not. Prerequisites: FIN 205 and ECO 251.
233. Economics of the Family. This course uses microeconomic tools to analyze the family. Topics include marriage markets, economics of polygamy and dowry, demand for children, and insurance and the family. Prerequisite: ECO 207.
234. Regulation of Economic Activity. Analysis of the impact of government regulation in transportation, safety, and health on economic welfare and efficiency. Prerequisite: ECO 207.
235. The World Economy, Technology, Population, and Growth. This course examines the reasons for the growth in population and income as well as the reasons for uneven growth. Prerequisite: ECO 108.
236. Economics of Health. Analysis of factors that affect supply and demand in the market for medical care: risk, insurance, externalities, ethics, regulation. Prerequisite: ECO 207.
237. Economics of Education. Costs and returns to investment in education; public policy decisions about education; educational finance. Prerequisite: ECO 207. (Spring)
251. Industrial Organization—Theory and Evidence. An examination of the market structure, conduct, and performance of contemporary American industry. Assessment of industry concentration, market control, and associated pricing and innovative behavior is emphasized. Prerequisite: ECO 207.
252. Economics and Societies in Latin America and the Caribbean Since 1492. Provides historical explanation for the general problem of material poverty and the sociopolitical crises that characterize contemporary Latin America and the Caribbean. Same as AAS 252 and HIS 203.
255. Africa’s Sleeping Giant: Nigeria since the Islamic Revolution of 1804. This course is taught in the context of the world economic order, its evolution from the sixteenth century and the location of different parts of the world within it. The course focuses on the historical development of socioeconomic and political structures over time to explain why the giant of Africa has continued to slumber. Same as HIS 272 and AAS 260.
261. State and Local Public Finances. Examination of local taxation, provision of services, and intergovernmental fiscal relations. Prerequisite: ECO 207.
263. Public Finance and Fiscal Policy. Government tax and expenditure policies and their effect on resource allocation and income distribution. Prerequisite: ECO 207.
264. Urban Economics: Prospects for Metropolitan America. Examines conditions of urban America with emphasis on issues that are of particular importance to policy makers. Prerequisite: ECO 207. Same as AAS 264.
265. Law and Economics. Economic analysis of property rights, contracts, torts and civil procedure, crimes and criminal procedure, government regulation and controls, and alternative legal rules and systems. Prerequisite: ECO 207.
269. International Economics. Trade patterns and comparative advantage; commercial policy and the distribution of gains from trade; balance of payments problems. Prerequisite: ECO 207.
270. International Finance. The economics and institutions of flexible and fixed exchange rates, international money markets and Eurocurrencies, international debt and direct investment, and the balance of payments. Prerequisite: ECO 207 and 209. (Spring)
271. Economics of Human Behavior. This course applies economic principles to understand various aspects of human behavior that have usually been considered to be outside the realm of economics. Prerequisites: ECO 207 and 231.
272. International Political Economy. Presents an overview of the international political economy and the role of nation-states within it. Same as PSC 274. (Spring)
273. Economic Growth and Development. This course begins with the empirical facts of economic growth and how growth economists have struggled to explain the evidence. Questions that this course addresses include How rich are rich countries? How poor are poor countries? Why are there these differences? Prerequisites: ECO 207 and calculus.
274. Mathematical Economics. Economic issues in consumer and producer theory treated in a formal, mathematical manner. Prerequisites: calculus and ECO 207.
282. Introduction to Positive Political Theory. An introduction to some recent developments in explaining and evaluating government behavior.
286. Political Economy of Property Rights. This course considers the political economy of property rights with special attention to applications to natural resources problems, organizational design, post-Communist transformations. Prerequisite: ECO 207. Same as PSC 286.
288. Introduction to Game Theory. An introduction to game theory with numerous applications to economic and political settings. Prerequisite: ECO 207. Same as PSC 288.
290. Political Economy of Markets and Hierarchies. This course examines markets, firms, states, and communities, asking how they work and who benefits (and who loses) from using them.
291. Political Economy of Economic Development. This course investigates both theoretical and empirical issues in economic growth. Examples are drawn from recent international experiences including those of the newly developed nations of the Far East and of formerly Communist block countries.
293. Politics and Economics of Post-Communist Transformation. This course focuses on structural adjustment policies, stabilization, privatization, liberalization, and the political economy of transition to a market. Same as PSC 292.
294. Economic Development in a Global Perspective. This course examines the development of, and connection between, the economies of Europe and Asia since 1550. Same as HIS 294.
371. Evolution of the World Economic Order Since the Sixteenth Century. This course deals with the economic relations between the developed and less developed parts of the world since the sixteenth century. Attention is given to the impact of slavery and the slave trade upon Africa, Europe, and the Americas, and to the role of overseas trade in European and American development and its impact on the rest of the world. Same as HIS 357W/457 and AAS 371.
385. The Atlantic Slave Trade and Africa, 1650–1850. The main thrust of the course shows the extent to which the Atlantic slave trade retarded the development of capitalism in Africa between 1650 and 1850, and so creating the conditions for the imposition of European colonial domination on the continent from the late nineteenth century. Same as AAS 375 and HIS 356W/456.

389. Senior Seminar. Supervised research on an economic problem or policy issue, culminating in papers that serve as a basis for seminars. Taken in senior year or with permission of instructor. (Spring)

390. Supervised Teaching of Economics. Responsibility for one recitation section and/or for holding office hours under the instructor’s supervision. Departmental approval required.

391. Independent Study. Designed for advanced students seeking to do research beyond what is contained in the regular course offerings. Requires faculty supervisor in the economics department.

394. Internship. Not for concentration credit. Requires faculty supervisor in the economics department.

The following graduate courses are open to advanced undergraduates with permission of the instructor:

471. Modern Value Theory I. The foundation of modern microeconomic analysis, including consideration of consumer behavior, the theory of the firm, equilibrium under alternative market structures, and welfare implications. (Fall)

472. Modern Value Theory II. Introduction to general equilibrium analysis, including modern treatment of existence, stability, and comparative statics properties; elements of capital theory.

475. Macroeconomics I. Reviews the main empirical regularities that characterize economic growth and business fluctuations in market economies. Discusses various theoretical models of the business cycle as well as the macroeconomic impact of fiscal and monetary policy. (Fall)

476. Macroeconomics II. This course continues with the themes developed in 475; business cycles, economic growth, fiscal and monetary policies. More emphasis is placed on the tools required to do modern macroeconomics: dynamic programming, difference equations, Markov chains, etc. Computational techniques such as linear quadratic and discrete state-space dynamic programming, the Coleman algorithm, and parameterized expectations are taught. (No prior knowledge of these techniques is assumed.)

481. Mathematical Economics I. This course covers the use of optimization theory in economic analysis. The topics covered include finite-dimensional optimization (unconstrained optimization, Lagrange’s Theorem, the Kuhn-Tucker Theorem), the role of convexity in optimization, parametric continuity of solutions to optimization problems, and finite and infinite horizon dynamic programming.

483. Introduction to Mathematical Statistics. Credit—2 hours. Elements of probability theory and statistics as employed in the econometrics sequence ECO 484–485. (Fall)

484. Introduction to Econometrics. Credit—2 hours. Estimation and hypothesis testing in the standard linear model; small and large sample properties; generalized methods of moments. Prerequisite: ECO 483 or departmental permission. (Fall)

485. Elements of Econometrics. Credit—3 hours. Extensions of the general linear model to handle serial correlation, heteroskedasticity, simultaneity, maximum likelihood estimation, and testing. Diagnostic checking of estimated models. Problems in the analysis of individual unit data—qualitative dependent variables and sample self-selection. Prerequisites: ECO 483 and 484. (Spring)

ENGLISH

David Bleich, Ph.D. (New York University) Professor of English and Professor in the College

Morris Eaves, Ph.D. (Tulane) Professor of English

Kenneth Gross, Ph.D. (Yale) Professor of English

Thomas G. Hahn, Ph.D. (California, Los Angeles) Professor of English

Bette London, Ph.D. (California, Berkeley) Professor of English

James Longenbach, Ph.D. (Princeton) Joseph H. Gilmore Professor of English

Patrick Loughnane, Ph.D. (George Washington University) Adjunct Professor of English and of Film and Media Studies; Curator of Motion Pictures and Director of the L. Jeffrey Selznick School of Film Preservation

Alan Lupack, Ph.D. (Pennsylvania) Adjunct Professor of English and Curator of the Rosell Hope Robbins Library

John Michael, Ph.D. (Johns Hopkins) Professor of English and of Visual and Cultural Studies

Russell A. Peck, Ph.D. (Indiana) Professor of English and John H. Deane Professor of Rhetoric and English Literature

Joanna Scott, M.A. (Brown) Roswell S. Burrows Professor of English

Frank Shuffelton, Ph.D. (Stanford) Professor of English and Chair of the Department

George Grella, Ph.D. (Kansas) Associate Professor of English and of Film and Media Studies

Sarah Higley, Ph.D. (California, Berkeley) Associate Professor of English

Barbara Roman, M.A. (Boston) Associate Professor of English

Rosemary Kelg, Ph.D. (Cornell) Associate Professor of English

Jeffrey Tucker, Ph.D. (Princeton) Associate Professor of English and Director of Frederick Douglass Institute for African and African-American Studies

Genevieve Guenther, Ph.D. (California, Berkeley) Assistant Professor of English

Stephanie Li, Ph.D. (Cornell) Assistant Professor of English

Katharine Mannheimer, Ph.D. (Yale) Assistant Professor of English

Albert J. Memmott, Ph.D. (Minnesota) Adjunct Assistant Professor of English

Jason Middleton, Ph.D. (Duke) Assistant Professor of English

Greta Niu, Ph.D. (Duke) Assistant Professor of English

Suprima Rajan, Ph.D. (North Carolina, Chapel Hill) Assistant Professor of English

Nigel Maister, M.F.A. (Carnegie Mellon) Senior Lecturer in English and Director of International Theatre Program

Gordon Rice, M.F.A. (California Institute of the Arts) Senior Lecturer in English and Production Manager of International Theatre Program

Deborah Rossen-Knill, Ph.D. (Minnesota) Senior Lecturer in English and Director of the College Writing Program

Curtis Smith, B.A. (SUNY, Geneseo) Senior Lecturer in English

Kenneth Johnson, B.A. (Seattle) Lecturer in English and Director of Forensics

Thomas Gavin, M.A. (Toledo) Professor Emeritus of English

Richard Gollin, Ph.D. (Minnesota) Professor Emeritus of English and of Film and Media Studies

Cyrus Hoy, Ph.D. (Virginia) John B. Trevor Professor Emeritus of English

Bruce Johnson, Ph.D. (Northwestern) Professor Emeritus of English

James William Johnson, Ph.D. (Vanderbilt) Professor Emeritus of English

Jarold W. Ramsey, Ph.D. (Washington) Professor Emeritus of English

Part-time instructors and part-time assistant lecturers are not included in the above list.

The Department of English offers work leading to a concentration for the B.A. degree and, at the graduate level, to the M.A. and Ph.D. degrees. The department also offers undergraduate minors in writing (creative writing or journalism), English literature, and theater.

The program of concentration in English is designed to give students knowledge of British and American literary works in their historical and cultural contexts, and to develop writing skills, as well as critical abilities for reading in a variety of periods, genres, and methodologies. In addition to the standard concentration in English, students may complete concentrations with emphases in Creative Writing; Theater; and Writing, Media, and Communication.

A student preparing to concentrate in English should get in touch with the department’s Director of Undergraduate Studies, usually early
in the second semester of the sophomore year. All majors should consult their advisors regularly to maintain a coherent program that benefits their particular interests.

The English Honors Program is open to English majors by invitation. All junior English majors are invited to apply. Students who are accepted into the program enroll in a special honors seminar in the fall of their senior year, do a preliminary research project, and write an honors essay in the spring semester. Students who successfully complete these requirements receive a degree with honors in English.

**GENERAL COURSE INFORMATION**

Students wishing to take any English course numbered 200 or higher should generally have satisfied the College’s primary writing requirement or have taken at least one introductory course (100-level) in literature.

Courses numbered 200–390 are customarily open to sophomores, juniors, seniors, and qualified first-year students; approval of the instructor may be required for enrollment in some courses.

Permission of the instructor is generally required for 120, 121, 122, 125, 126, 132, 133, 138, 275, 276, 292, 293, 294, 298, 299, 370, 375, 376, and 390.

**REQUIREMENTS FOR A CONCENTRATION IN ENGLISH**

A minimum of 10 courses is required. At least seven of the 10 must be English courses at the 200 or 300 level.

1. Concentrators must take two of the following courses, ideally by the end of the sophomore year:
   - ENG 112. Classical and Scriptural Backgrounds
   - ENGL 113. British Literature I
   - ENG 114. British Literature II
   - ENG 115. American Literature

2. Concentrators may take one additional course at the 100-level, either a third survey course from the list above (ENG 112, 113, 114, 115) or one of the following “approaches to literary study” courses:
   - ENG 100. Great Books
   - ENG 101. Maximum English
   - ENG 111. Introduction to Shakespeare
   - ENG 116. Introduction to African-American Literature
   - ENG 117. Introduction to the Art of Film

3. Of the seven or eight courses at the 200 or 300 level:
   - Two must be in British or American literature before 1800 (from courses marked as such in the course schedule). Two must be in British or American literature after 1800 (from courses marked as such in the course schedule).
   - One must be a Research Seminar (from the annual list provided by the English department), ideally taken in the junior or senior year. ENG 390, Honors Seminar, will count as a Research Seminar.

4. A minimum of 10 courses is required.
   - Two courses (8 credits) at the 100 level from among the following:
     - ENG 121. Fiction
     - ENG 122. Poetry
     - ENG 123. Playwriting
     - ENG 125. Speculative Fiction
   - One of the following courses:
     - ENG 275. Advanced Creative Writing: Poetry
     - ENG 276. Advanced Creative Writing: Fiction
     - ENG 277. Screen Writing
   - One of the following:
     - ENG 375. Seminar in Fiction Writing
     - ENG 376. Seminar in Poetry Writing

5. Concentrators must take two additional English courses at the 200 or 300 level, two of which must be in British or American literature before 1800 and two in British or American literature after 1800.

6. Students accepted into the honors program in English may write original fiction (a collection of stories or a novella), poetry, or a play to fulfill the requirements for the honors essay. Students choosing this option must have the approval of the creative writing advisor in the English department.

**CONCENTRATION IN ENGLISH: WRITING, MEDIA, AND COMMUNICATION**

The Concentration in Writing, Media, and Communication is designed to serve students who want to explore the department’s multifaceted array of courses related to the forms of communication. Such courses—in editing, rhetoric, the history of the media of arts and communication, journalism, professional writing, public speaking, debate, etc.—may be of special interest to students who are contemplating careers in such areas as law, nonfiction writing, publishing, print journalism, or electronic journalism. The concentration, however, does not present a narrowly preprofessional curriculum; rather, it is designed to reflect the way English has come to be understood as encompassing a full array of practices from oral to electronic and to highlight the way English, in its objects of study, addresses the history, theory, and analysis of media.

While the requirements below offer a general template for the concentration, majors should devise a specific course of study in close consultation with the Director of Undergraduate Studies or designated writing, media, and communication advisor, who must approve the final course of study.

A minimum of 10 courses is required, at least six of which must be at the 200 or 300 level.

1. Concentrators must take two literature courses, at least one of which must be at the 200 or 300 level.

2. Concentrators must take at least six courses from the following list, at least three of which must be in a single subgroup; this list is not comprehensive, so students should consult with the Director of Undergraduate Studies or concentration advisor for complete and updated information about applicable courses.

**JOURNALISM AND NONFICTION WRITING**

- ENG 130. Seminar in Writing (topical)
- ENG 131. Reporting and Writing the News
- ENG 132. Feature Writing
- ENG 133. Editing Practicum
- ENG 138. Journalism Case Studies
- ENG 132. Creative Nonfiction
- ENG 241. Literary Journalism

**MEDIA**

- ENG 117. Introduction to the Art of Film
- ENG 118. Introduction to Media Studies
- ENG 255. Silent Cinema
- ENG 256. Sound Cinema
- ENG 263. Media Studies (can be taken more than once with different topics)
- ENG 283. Media ABC
- ENG 280. Hypertext Writing
- ENG 282. Editing and Desktop Publishing

**RHETORIC AND LANGUAGE**

- ENG 134. Public Speaking
- ENG 135. Debate
- ENG 136. Advanced Debate
- ENG 137. Freedom of Expression
- ENG 200. History of the English Language
- ENG 249. Gender, Writing, and Representation
- ENG 284. Orality, Language, and Literacy
- ENG 285. Advanced Writing and Peer Tutoring
- ENG 286. Presidential Rhetoric

With permission of the Director of Undergraduate Studies, students may count up to two preapproved courses taught in other departments (e.g., Art and Art History, History) toward the three courses that may be distributed across any of the groups above. Concentrators may also substitute an additional internship (ENG 394) for one of these three courses.

3. Concentrators must take an approved ENG 394, Internship in English, or equivalent.
4. Concentrators must take one additional 200- or 300-level English course, from any of the above three groups.

CONCENTRATION IN ENGLISH: THEATER

The English department offers a special major intended to provide institutional support and recognition to students who want to invest a significant part of their undergraduate careers in theater and theater-related courses, and to furnish such students with credentials reflecting their work in theater.

A minimum of 12 courses (amounting to at least 48 credit hours) in English and theater courses is required.

1. Students must take two of the following surveys:
   ENG 112. Classical and Scriptural Backgrounds
   ENG 113. Literature I
   ENG 114. Literature II

2. Of the remaining courses in literature and theater, 16 hours of credit must be in theater production (either onstage or backstage). Each student must work on at least four productions, serving in stage management or as an assistant director for at least one.

3. Theater concentrators also are required to take 8 hours of credit in theater method and/or performance courses, choosing from the following (spring course numbers in parentheses):
   ENG 123. Acting Techniques
   ENG 170 (171)/270 (271). Technical (and Advanced Technical) Theater
   ENG 172. Intro to Stage Lighting and Sound

4. In cases where some courses are unavailable, students should consult with the Director of Undergraduate Studies for possible substitutions.

For further information, contact the Director of Undergraduate Studies and/or the Artistic Director of the Theatre Program.

REQUIREMENTS FOR A MINOR IN ENGLISH

The Department of English offers minors in English literature, theater, and writing; the writing minor includes tracks in journalism and creative writing. The minors in theater and writing emphasize the practical sides of the disciplines and are open to English majors as well as nonmajors. All three minors stipulate a minimum of six courses, five of which must be taken in residence. No more than two courses in one’s major may be counted toward the minor. Students wishing to minor in English should contact the Director of Undergraduate Studies in English.

THE MINOR IN ENGLISH LITERATURE

1. ENG 113. British Literature I
2. ENG 114. British Literature II
   or
   ENG 115. American Literature
3. Four additional courses in British or American literature, three of which must be at the 200 or 300 level

THE MINOR IN WRITING

Students minoring in writing must choose one of these tracks:

Journalism

Six courses are required:
1. ENG 131. Reporting and Writing the News
2. ENG 132. Feature Writing
3. At least one of the following courses:
   ENG 130. Seminar in Writing
   ENG 120. Introduction to Creative Writing
   ENG 121. Creative Writing: Fiction
   ENG 122. Creative Writing: Poetry
   ENG 125. Speculative Fiction
4. At least two of the following courses:
   ENG 133. Editing Practicum
   ENG 391. Research Project in Journalism
   ENG 394. Internship
5. Appropriate additional courses, if needed, to be chosen from the 200- and 300-level courses in literature or criticism.

Creative Writing

Six courses are required:
1. Two creative writing courses (8 credits):
   ENG 120. Introduction to Creative Writing
   ENG 121. Creative Writing: Fiction
   ENG 122. Creative Writing: Poetry
   ENG 123. Playwriting. Credit—2 hours
2. At least one advanced creative writing course:

THE MINOR IN THEATER

The minor in theater consists of a minimum of 24 credits taken from the following three categories. No more than two courses included in one’s major may be counted toward the minor.

1. A student must work on at least two, but no more than three, productions, acquiring at least 8 credits in performance courses (either onstage or backstage):
   ENG 290/291. Plays in Production
   ENG 292/293/294/295. Plays in Performance

2. Theater method and performance courses; 8 credits in all (spring course numbers in parentheses):
   ENG 123. Playwriting—2 credits
   ENG 170 (171)/270 (271). Technical (and Advanced Technical) Theater
   ENG 172. Intro to Stage Lighting and Sound

3. Dramatic literature—8 credits (at least two courses):
   ENG 111. Introduction to Shakespeare, or ENG 203. Medieval Drama
   ENG 208. Renaissance Drama, Elizabethan and Jacobean Drama
   ENG 209. Problems in Shakespeare, or
   ENG 210. Shakespeare
   ENG 214. Restoration and Eighteenth-Century Drama

4. African-American Drama

5. Major Author—a playwrite

Additionally, students taking an Internship in Theater (ENG 398), Independent Study (ENG 391) whose subject is theater or dramatic research, or enrolled in a standard Research Seminar (ENG 380) or Honors Seminar (ENG 396) with a dramatic literature/theatrical focus might also have those classes count towards a minor in theater. Similarly, Study Abroad options in London and Bath (if allied to dramatic or theatrical work) might count towards a minor. Other courses in the English department relating to drama and/or theater may, from time to time, be valid additions to this list, also. See the Director of Undergraduate Studies for details.
In cases where some courses are unavailable, students should consult with the Director of Undergraduate Studies for possible substitutions.

For further information, contact the Director of Undergraduate Studies and/or the Artistic Director of the Theatre Program.

UPPER-LEVEL WRITING REQUIREMENT

Because most upper-level English courses are writing intensive, providing extensive attention to writing and revision, concentrators fulfill the upper-level writing requirement as part of the regular requirements for the major. For students doing the standard English concentration, this includes a 300-level research seminar, which serves as a major component of the upper-level writing requirement. For concentrators doing English with an emphasis on Creative Writing and Writing, Media, and Communication, the concentration necessarily includes upper-level courses with writing as their primary subject and medium. Concentrators in English Theater must make individual arrangements with their instructors to complete the upper-level writing requirement, by designating two courses as “W” sections; these arrangements must be approved by both the course instructor and the Director of Undergraduate Study.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

INTRODUCTORY AND GATEWAY COURSES


101. Maximum English. A gateway course introducing students to basic concepts and skills, and to the particular features of the English department and its faculty.

111. Introduction to Shakespeare. A selection of his major plays.

112. Classical and Scriptural Backgrounds. The great tradition, from Homer, Greek drama, Plato, and Virgil to the Bible and Dante. Same as REL 140.


114. British Literature II. Major themes and central ideas in British literature of the eighteenth, nineteenth, and twentieth centuries.

115. American Literature. Significant achievements by American writers of poetry, fiction, and other prose in the nineteenth and twentieth centuries.


117. Introduction to the Art of Film. The primary visual, aural, and narrative structures and conventions by which motion pictures create and comment upon significant human experience. Same as AH 112 and FMS 152.

CREATIVE WRITING COURSES

120. Creative Writing. Introductory workshop exploring multiple genres.

121. Creative Writing: Fiction. Short story workshop.


123. Playwriting. Credit—2 hours. A course devoted to the understanding and execution of dramatic writing that is unique to the theater.

125. Speculative Fiction. A creative writing course dedicated to commercial and/or literary fiction with an emphasis on science fiction, fantasy, and magic realism.

126. Creative Nonfiction.


277. Screen Writing. The primary text for this course is students’ own scripts in progress. The course also examines various professional scripts, both film and television.


376. Seminar in Writing: Poetry.

377. Writing in Other Genres.

WRITING, JOURNALISM, AND COMMUNICATION

130. Seminar in Writing. Students read and write essays on a range of topics in the arts and sciences. Topics vary from year to year. The course emphasizes mastery of voice, argument, and rhetorical strategy.

131. Reporting and Writing the News. A laboratory course (requiring typing) on the fundamentals of gathering, assessing, and writing news.

132. Feature Writing. A workshop administered by the Department of English and the Gannett Newspapers.

133. Editing Practicum. Practicum seminar on editing a newspaper, with special attention to the Campus Times.

134. Public Speaking. Practice in effective small-group communication and the presentation of expository and persuasive speeches.

135. Debate. Critical thinking and reasoned decision making through argumentation.


137. Freedom of Expression. This course explores the controversies surrounding censorship, free speech, and hermeneutics.


280. Hypertext Writing.

281. Literary Journalism.

282. Editing and Desktop Publishing.

283. Media ABC. Provides a historical and critical introduction to the idea of medium and media, including books, paint, electronic files, music, photography, etc.


285. Advanced Writing and Peer Tutoring. This course prepares selected undergraduates for work as writing advisors.

286. Presidential Rhetoric.

QUEST COURSES

19X. Quest Courses. Courses that introduce students to the study of literature and the practice of research. Topics vary for each section.

MAJOR AUTHORS AND HISTORICAL PERIODS

Pre-1800

200. History of the English Language. The development of the English language from the Anglo Saxon period on up, focusing on texts from representative periods.

201. Old English Literature. Literature written in England before the Norman Conquest. Latin works are read in translation; vernacular works, in the original.

202. Middle English Literature. Poetry, prose, and drama of the thirteenth, fourteenth, and fifteenth centuries, exclusive of Chaucer. Readings in Middle English.

203. Medieval Drama. English drama from its beginnings until 1580, including material from the mystery cycles, moralities, and early Tudor drama.

204. Chaucer. The principal works of Chaucer, in their historical and intellectual context. Readings in Middle English. Same as REL 208.

206. Studies in Medieval Literature.

207. English Renaissance Literature. Sixteenth-century literature from Sir Thomas More to Spenser, with some attention to the continental background.

208. Elizabethan and Jacobean Drama. English Renaissance drama through 1642, exclusive of Shakespeare.


211. Milton. The works of Milton in their historical and intellectual context.

213. Studies in Renaissance Literature.


215. Early British Novel. The novel from its beginnings to the early nineteenth century; emphasizing such novelists as Defoe, Fielding, Richardson, and Austen.

218. Early American Literature. From 1630 to 1830, including Puritan nonfiction and poetry; exploration narrative; and fiction, drama, and poetry of the Revolutionary and early national eras.

Post-1800
220. Romantic Literature. Major writers, other than novelists, of the early nineteenth century, with particular emphasis on poets from Blake through Keats.
221. Victorian Literature. The major intellectual, cultural, and artistic developments of the Victorian period (1830–1900), in prose, drama, verse, and related arts.
225. American Romantics. From 1830 to 1865, including Emerson and the transcendental movement, abolitionist writing and slave narrative, representative fiction, and poetry by Poe, Whitman, Melville, Stowe, and others.
226. American Realists. From 1880 to 1912, including poetry by Dickinson and Frost; realist and naturalist fiction by Twain, Wharton, James, Dreiser; representative nonfiction and philosophy.
227. American Moderns. From 1913 to 1941, including Eliot, Stevens, Cather, Faulkner, Hemingway, Fitzgerald, O’Neill, W. C. Williams, and others.
228. African-American Drama.
231. Twentieth-Century British Novel. The novel from 1900 to the present, emphasizing such novelists as Conrad, Joyce, Woolf, and Lawrence.
232. Modern Literature.
234. Modern Fiction.
235. Modern Drama. Great modern dramas from Ibsen to Ionesco as reflectors of the main currents in modern thought and feeling.
237. Contemporary Poetry. Poetry in English from around 1945 to the present, emphasizing latter-day transformations.
238. Studies in Modern and Contemporary Literature.

LITERARY MODES AND SPECIAL TOPICS
240. Literary Criticism and Theory.
241. Lyric Poetry.
242. Topics in Literature.
243. Studies in a Major Author.
244. Studies in a Literary Tradition.
246. Detective Fiction. Examines some of the major authors and books of detective fiction, both British and American, concentrating on the twentieth century.
247. Science Fiction. Examines a range of science fiction texts and issues, including works by Mary Shelley, H. G. Wells, Isaac Asimov, Robert Heinlein, Samuel R. Delany, and more.

249. Gender, Writing, and Representation.
250. Literature and Ethnicity.
253. The Literature of the Bible.
254. Arthurian Literature.

FILM AND MEDIA STUDIES

117. Introduction to the Art of Film. Same as FMS 132.
118. Introduction to Media Studies. The cultural, aesthetic, and economic history of visual media. Same as FMS 131.
255. Introduction to Film History: Silent Cinema. Same as FMS 253.
256. Introduction to Film History: Sound Cinema. Same as FMS 254.
258. Film Analysis.
259. Popular Film Genres. An intensive study of selected types of popular films in their larger cultural context. Same as FMS 251.
260. Film History. Same as FMS 254.
261. Film Theory. An introduction to the history, the theory, and especially the practice of criticism. Same as FMS 255.
262. Studies in a National Cinema. Films from a particular national cinema—British, Japanese, German, French, Italian, and others from various periods. Same as FMS 256.
263. Media Studies. This course addresses the history and theory of a range of communications media and visual technologies in science, industry, and popular culture. Same as FMS 257.
264. Studies in a Director. A course in the works and career of an outstanding and identifiable film director: Hitchcock, Warhol, Huston, Bunuel, Renoir, etc. Same as FMS 253.
265. Issues in Film. The course takes up particular concepts, ideas, and ideology in film, often spanning periods, nations, and genres. Same as FMS 252.
266. Issues in Film Theory. Same as FMS 244.
267. Topics in Media Studies. Same as FMS 250.
268. Museum Studies. Same as FMS 254.
280. Hypertext Writing. Same as FMS 245.
283. Media ABC. Provides a historical and critical introduction to the idea of medium and media, including books, paint, electronic files, music, photography, etc. Same as FMS 249.

THEATER COURSES
123. Playwriting. Credit—2 hours. A course devoted to the understanding and execution of dramatic writing that is unique to the theater.
170/171. Technical Theater. An introductory course to the theories, methods, and practice of set construction, power tools, rigging, stage lighting, drafting, sound, and scene painting. Lab participation in theater program productions required.

172. Intro to Stage Lighting and Design. The course undertakes to introduce students to the various elements of theater design. Lighting techniques, sound design, and set design are all covered from time to time.

174/175. Acting Techniques. Training in the techniques by which individual actors set forth the characters recorded in dramatic texts.

176/177. Voice and Movement for the Actor. This is an introductory course on voice and movement for the actor.

180. Directing. Training in the methods by which actor and director embody the dramatic text; emphasis on studio practice. Limited to one or two students. Prerequisite: Permission of instructor.

182. The Actor and the Text.

290/291. Plays in Production. Set building, prop and costume development, and publicity for current production.

292/293/294/295. Plays in Performance. For actors and stage managers working on the current production.

298. Acting Lab I. Credit—2 hours. Mandatory acting lab for students in ENG 291.
299. Acting Lab II. Credit—2 hours. Mandatory acting lab for students in ENG 293.

ADDITIONAL UPPER-LEVEL COURSES
350. Special Projects: Theater.
380–389. Research Seminars. Open to junior and senior English majors. Others may be admitted by permission of instructor.
391. Independent Study.
394. Internships in English.
396. Honors Seminar. Limited to students completing the English honors program.
398. Theater Internship. Limited to students completing the English honors program.

400-LEVEL COURSES
Qualified undergraduates may enroll in advanced seminars at the 400 level by permission of the Director of Undergraduate Studies and the Director of Graduate Studies in English and the instructor.

FILM AND MEDIA STUDIES

PROGRAM FACULTY
Douglas Crimp, Ph.D. (CUNY) Fanny Knapp Allen Professor of Art History and Professor of Visual and Cultural Studies
Morris Eaves, Ph.D. (Tulane) Professor of English
Patrick Loughney, Ph.D. (George Washington University) Adjunct Professor of English and of Film and Media Studies; Curator of Motion Pictures and Director of the J. Jeffery Selznick School of Film Preservation
Claudia Schaefer, Ph.D. (Washington, St. Louis)  Professor of Spanish
Sharon Willis, Ph.D. (Cornell)  Professor of Art History and of Visual and Cultural Studies
Joanne Bernardi, Ph.D. (Columbia)  Associate Professor of Japanese
Elizabeth Cohen, M.F.A. (Rhode Island School of Design)  Associate Professor of Art
George Grella, Ph.D. (Kansas)  Associate Professor of English and of Film and Media Studies
Ewa Hauser, Ph.D. (Johns Hopkins)  Adjunct Associate Professor of Political Science
Sarah Higley, Ph.D. (California, Berkeley)  Associate Professor of English
Rheinhild Steingrover, Ph.D. (SUNY, Buffalo)  Associate Professor of German (Humanities, Eastman School of Music)
Allen Topolski, M.F.A. (Pennsylvania State)  Associate Professor of Art
Emile Devereaux, M.F.S. (California, San Diego)  Assistant Professor of Art
Jason Middleton, Ph.D. (Duke)  Assistant Professor of English
Greta Niu, Ph.D. (Duke)  Assistant Professor of English
Richard M. Gollin, Ph.D. (Minnesota)  Professor Emeritus of English and of Film and Media Studies

FILM AND MEDIA STUDIES

The Film and Media Studies Program offers an interdepartmental concentration leading to a bachelor’s degree. A minor in film and media studies is also available. The film and media studies concentration offers students an opportunity to explore motion pictures, television, and the electronic arts as art forms and cultural phenomena. It consists of specific courses offered by participating departments, and it provides the opportunity for screening and analysis of centrally important works in the history of cinema and media from the core collection in the Film and Media Studies Center. Twenty or more film courses are offered annually by various departments; a list is made available each semester in time for preregistration.

The program offers a variety of clusters in film and media studies.

The Film and Media Studies Program also enjoys a close relationship with George Eastman House. All University students have free access to the museum and library on presentation of student identification. Important film screenings and special events are offered several nights a week at the Dryden and Curtis Theatres. The archival resources of the museum are also available for coursework and for special projects. George Eastman House also offers many exciting opportunities for internships, especially in the conservation of film and photography. In 2004, the University of Rochester and George Eastman House initiated a joint M.A. program. Students in the L. Jeffrey Selznick School of Film Preservation at the Eastman House have the option of enrolling in a two-year graduate program leading to a Master of Arts degree through the Department of English. For more information contact the Film and Media Studies Director or the Graduate Director of the English Department.

REQUIREMENTS FOR A CONCENTRATION IN FILM AND MEDIA STUDIES

There are many career opportunities open to students of film and the media arts. Many students go on to film or television school, pursuing graduate work in producing, directing, editing, cinematography, screenwriting, acting, and other creative aspects of media. Others choose to pursue the graduate study of media history, theory, and criticism in master’s or doctoral programs. Media law and business also present exciting opportunities for postgraduate study. A major in film and media studies can also lead to exciting careers in print and media journalism, arts and museum management, film preservation and curating, library science, and multimedia authoring.

The concentration consists of 12 courses organized in the following categories. Students are admitted to the concentration on recommendation of their advisor. Alternative, individualized concentrations for studying media may also be proposed. The major includes a writing requirement, which is satisfied by successful completion of two intensive upper-level writing courses. Each semester the program designates several such courses.

- One of two core courses
  - a. FMS 131. Introduction to Media Studies
  - b. FMS 132. Introduction to Film Studies

- One course in film/media production
  - One course in film/media history
  - One course in international or transnational film/media
  - One course in media theory
  - One course in media production
  - Five elective film/media studies courses (two of which must be at the 200 or 300 level)

REQUIREMENTS FOR A CONCENTRATION IN MEDIA PRODUCTION

Students interested in media production are encouraged to creatively seek out courses that deepen their background in the arts—especially in studio art, theater, and creative writing—and to integrate them into their program of study. Concentrators in film and media studies may also elect to follow a special concentration in media production as an alternative to the standard program of study. The goal of the special concentration is to prepare students with the basic, creative background and the practical experience they need either to pursue the postgraduate study of film and television production or multimedia authoring, or to begin careers in these industries. The special concentration in media production comprises 12 courses, organized in the following manner:

- One of two core courses
  - a. FMS 131. Introduction to Media Studies
  - b. FMS 132. Introduction to Film Studies

- One course in film/media history
- One course in media analysis and criticism
- One upper-level course (200 level or above in a nonproduction area)
- Five courses in production-related areas

The five courses in production-related areas may include work in creative writing, theater, photography, and the digital arts as well as media production.

Students will be admitted to the concentration on recommendation of their advisor. Alternative, individualized concentrations for studying media may also be proposed through the Committee on Interdepartmental Majors. Double-majoring in film and media studies and another field is also encouraged though not more than two courses may be proposed in common for the two majors.

Film and media studies concentrators may, if they wish, include in their senior year an independent reading or research course, FMS 391, or an independent project that calls upon the knowledge and discrimination acquired while completing these requirements.

FMS 394, film internships at television stations and local industries, and abroad, are open to film students under the sponsorship of the Film and Media Studies Program. In addition, most majors intern in the Motion Picture Department of George Eastman House. The director can also recommend many other study abroad programs for a semester or a full year. Contact the director for more information. For information about internships abroad, go to the Center for Study Abroad.

The film and media studies honors program offers majors an opportunity to spend their senior year concentrating on a specific course of research or creative endeavor. Interested junior film and media studies majors should consult with the director.

REQUIREMENTS FOR A MINOR IN FILM AND MEDIA STUDIES

A minor concentration in film and media studies requires six courses as outlined below.

- FMS 132. Introduction to the Art of Film
- FMS 131. Introduction to Media Studies
- One course in film/media history
• One course in either film/media theory or analysis and criticism
• Three additional film/media studies courses chosen in consultation with the faculty advisor. These courses may include three production-related courses thus comprising in effect a minor concentration in media production.

UPPER-LEVEL WRITING REQUIREMENT
Film and media majors will take two designated upper-level writing emphasis courses in the major. Please contact the Program Office for a list of designated courses.

COURSES OF INSTRUCTION
Course listings are published before each semester. For course descriptions see departmental listings. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

ENGLISH
131. Introduction to Media Studies. Same as ENG 117.
132. Introduction to the Art of Film. Same as ENG 117.
233. Introduction to Film History: Silent Cinema. Same as ENG 255.
234. Introduction to Film History: Sound Cinema. Same as ENG 256.
251. Popular Film Genres. Same as ENG 259.
252. Issues in Film. Same as ENG 265.
253. Studies in a Director. Same as ENG 264.
254. Studies in Film History. Same as ENG 260.
254. A Study in Museum Studies. Same as ENG 268.
255. Film Theory. Same as ENG 261.
256. Studies in a National Cinema. Same as ENG 262.
257. Media Studies. Same as ENG 263.

IN FILM AND MEDIA STUDIES
161. Introductory Video and Sound. Same as SA 161.
162. Concepts: Introduction to Video and Sound. Same as SA 162.
300. Supervised Teaching.
391. Independent Study.
392. Practicum.
393. Senior Project.
394. Internship.

MODERN LANGUAGES AND CULTURES
219. Race and Gender in Popular Film. Same as CLT 219.
238. New German Cinema. Same as GER 288.
239. Avant Garde Film. Same as GER 290.
240. Nazi Culture. Same as GER 287.
241. The Holocaust and After. Same as GER 47.
288.
238. New German Cinema. Same as GER 288.
239. Avant Garde Film. Same as GER 290.
240. Nazi Culture. Same as GER 287.
241. The Holocaust and After. Same as GER 47.
238. New German Cinema. Same as GER 288.
239. Avant Garde Film. Same as GER 290.
240. Nazi Culture. Same as GER 287.
241. The Holocaust and After. Same as GER 47.

255. Classical Film Theory. Same as CLT 211F.
281. Popular Film: Sex and Violence. Same as CLT 220.
283. History of Japanese Film. Same as JPN 283.
284. Monsters, Mobsters, and Swords. Same a JPN 284.
293. Russia Goes to the Movies. Same as RUS 267.
294. Spanish Film. Same as SP 288.

POLITICAL SCIENCE
256. Political Films: Cold War. Same as PSC 255.

STUDIO ART
260A. Introductory Digital Art. Same as SA 151.
260B. Advanced Digital Art. Same as SA 252A.
260C. Advanced Digital Art. Same as SA 252B.
260D. Advanced Digital Art. Same as SA 252C.
262A. Advanced Video and Sound Art. Same as SA 262A.
262B. Advanced Video and Sound Art. Same as SA 262B.
262C. Advanced Video and Sound Art. Same as SA 262C.
263A. Issues in Advanced Video and Sound. Same as SA 263A.
263B. Issues in Advanced Video and Sound. Same as SA 263B.
263C. Issues in Advanced Video and Sound. Same as SA 263C.

HEALTH AND SOCIETY

Designed as a part of a liberal education, health and society is a multidisciplinary program of study consisting of courses from several departments leading to a B.A. degree. The program is administered by the College Center for Academic Support (which is located in 312 Lattimore Hall) and is supervised by the Health and Society Committee.

COMMITTEE ON HEALTH AND SOCIETY
Theodore M. Brown, Ph.D. (Princeton) Professor of History, of Community and Preventive Medicine, and of Medical Humanities

Anthony T. Carter, Ph.D. (Rochester) Professor of Anthropology
Dean Harper, Ph.D. (Columbia) Professor of Sociology and Associate Professor of Psychiatry; Director of the Program
Bruce Jacobs, Ph.D. (Harvard) Professor of Political Science
Richard Dees, Ph.D. (Michigan) Associate Professor of Philosophy
Nancy Reynolds, M.S.P.H. (Massachusetts) Health Educator

Health and society is a multidisciplinary major intended for students considering careers in health care administration, health policy and planning, or the social services. Health and society majors planning careers in medicine should consult with a health professions advisor about premedical requirements.

The bachelor’s degree with honors is awarded according to three criteria: (1) “B+” or better performance in the following honors courses taken for the health and society major: HLS 116 (Introduction to Community Medicine), HLS 201 (Research in the Health Sciences), and HLS 301 (Senior Seminar in Health and Society); (2) completion of a senior thesis; and (3) an oral defense of the thesis. Detailed information about the requirements is available in the College Center for Academic Support in 312 Lattimore Hall.

The bachelor’s degree with distinction is awarded to students with a sufficiently high grade-point average in the major: 3.25 for highest distinction, 3.50 for high distinction, and 3.75 for highest distinction.

It is possible for students to earn the degree with both distinction and honors.

REQUIREMENTS FOR A MAJOR IN HEALTH AND SOCIETY
A total of 12 courses, distributed as follows:

Required Courses
• HLS 116. Introduction to Community Medicine
• STT 211. Applied Statistics for the Social Sciences I
• HLS 201. Research in the Health Sciences
• HLS 301. Senior Seminar in Health and Society

Health and Society Core Courses
(four from the following list)
• ANT 216. Medical Anthropology
• ECO 236. Health Policy
• HIS 208. Health, Medicine, and Social Reform
• HIS 209. Changing Concepts of Disease
• HIS 305W. American Health Policy and Politics
• PHL 225. Ethical Decisions in Medicine
• PSC 245. Aging and Public Policy
• PSY 283. Behavioral Medicine
• SOC 262. Medical Sociology
• CAS 394. London Health Sciences Internship
Elective Courses
Four from an extensive list available in the Center office.

Further information is available from the staff in the College Center for Academic Support.

UPPER-LEVEL WRITING REQUIREMENT
All majors are required to complete HLS 116. In addition, majors are expected to take one of the following courses: HLS 208W, HLS 209W, PSC 245W, SOC 262W, and possibly ECO 236 or PHL 225W. HLS 301 can also be taken as HLS 301W.

COURSES OF INSTRUCTION
Definitive course offerings are distributed before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

116. Introduction to Community Medicine. This course explores health issues in American society through a multidisciplinary, community-oriented approach, in order to better understand the limitations of a strictly biomedical approach to health and health policy. Same as HIS 116. (Fall, alternate years)

201. Research in the Health Sciences. This course is not intended to train students to do research in the health fields, but rather to help them understand the research that is done. Topics include design of research, epidemiology, survey research, case-control studies, clinical trials, services research. Prerequisites: HLS 116, STAT 211. (Spring)

208. Health, Medicine, and Social Reform. Same as HIS 208/PM479.


216. Peer Health Advocacy I. Examination of the ways in which health issues can impact the lives of college students and the college environment. In addition, students learn practical skills in “conversational leadership,” or how to talk appropriately with peers about their health behavior. (Fall)

217. Peer Health Advocacy II. Credit—2 hours. Continuation of HLS 216. (Spring)

301. Senior Seminar. This seminar exposes the student to issues in the making and implementation of health policy in the United States, examining such issues as the cost of medical care, managed care, health and poverty, the medical malpractice system, health care workforce issues, and patient autonomy. (Spring)

393. Senior Project.

394. Internship.

398. Senior Thesis.
The Department of History offers programs of study leading to the B.A. degree and to the B.A. degree with honors (and, on the graduate level, to the M.A. and Ph.D. degrees). The department also offers a minor in history. Nonmajors are welcome in all history courses and often become enthusiastic, successful students of history while pursuing other interests. The history concentration is valuable not only for those considering the historian's vocation, but also for pursuing careers in law, secondary school teaching, politics, and communications, among others.

The department also offers 16 clusters for non-majors to fulfill the social science divisional requirement in the Rochester Curriculum. These clusters consist of carefully selected sets of courses, and include both geographical (e.g., American History) and topical (e.g., War and Revolution) groupings.

The department offers a wide range of courses in its undergraduate program encompassing social, economic, cultural, intellectual, political, and psychological approaches to historical problems and periods. Most 100- and 200-level courses in the department are accessible to students with little preparation in history. In addition, the faculty offers 300-level seminars and courses designed for concentrators or other students interested in exploring more specialized historical problems.

### REQUIREMENTS FOR CONCENTRATION IN HISTORY

Before admission to a concentration in history, students must satisfactorily complete at least two history courses. Students may then count these courses toward fulfillment of the history concentration requirement, which consists of a total of 10 courses (or 40 credit hours), including:

- A minimum of six courses (or 24 credit hours) taken from members of the history department faculty, including visiting faculty with joint appointments in other departments; no more than four courses in the concentration may come from courses taken elsewhere, study abroad courses, AP credits (see next page), or cross-listed courses taught by faculty not formally associated with the Department of History. (Please note that some HIS courses are offered by faculty in other College departments and will not count toward the six-course minimum). Transfer students majoring in history are required to take a minimum of five courses in the department, thus meeting half the major requirements in residence.

- A minimum of one course in at least three of the following geographical areas—Africa, Asia and the Pacific, Europe, Latin America, the United States; a course covering more than one geographical area (for instance, a course on European imperialism) may nevertheless only count for one geographical area, which students designate.

- A minimum of two courses in each of two chronological periods—pre-1800 and 1800 to the present; courses with substantial coverage of both periods may only count for one, which students designate.

- Five history courses (or 20 credit hours) in an area of focus, which students choose from the following list—American and African-American History, American History, Asian and Asian-American History, Cultural and Intellectual History, Economic and Social History, European History, History of Science and Medicine, Global History, Women’s History; students may also choose to design a focus individually, in consultation with their departmental advisor; one of the five courses in the focus area must be a 300-level seminar (see below).

- The History Seminar (HIS 301W).

- One additional course at either the 200- or 300-level designated "W" (upper-level writing). Students may not take a second History Seminar (301W) for this requirement.

- At least one of the two courses used to fulfill the upper-level writing requirement must be in the student’s focus area within the concentration.

- All of these specific requirements are included within the 10 required courses, and overlap is allowed between requirements—for instance, a course on Traditional Japan may count both as a course in the geographical area of Asia and the Pacific and as a course in the pre-1800 chronological period.

- Students double-majoring in history and another department or program in the humanities or the social sciences divisions may, with the permission of the Director of Undergraduate Studies, use either one or two courses (a maximum of 8 credits) from their other major toward the fulfillment of the history major; double majors must, however, still meet the geographical and chronological distribution requirements and the 300-level seminar requirements with history courses.

- If study of a foreign language is pertinent to students’ focus areas (e.g., Japanese to Asian and Asian-American history, or Russian to European history) and will be used in research for history courses, then students may, with permission of the Director of Undergraduate Studies, count up to two courses (a maximum of 8 credits) of language study toward the history major; students using foreign language credits within the major must still meet the geographical and chronological distribution requirements, the 300-level seminar requirements, and the focus area requirement with history courses. (Please note: students using foreign language study to satisfy a humanities cluster may only overlap ONE course in the cluster with the history major.)

### ADVANCED PLACEMENT POLICY

Advanced Placement credit will be granted for scores of 4 or 5 on the American history, European history, or world history exams. Credit will be granted for only one AP course. This credit is elective credit and may not be used to satisfy the geographical or chronological distribution requirements in the major or minor or to satisfy the focus requirement in the major.

### REQUIREMENT FOR DISTINCTION IN HISTORY

To graduate with distinction in history, students must have a GPA of 3.8 in the major. (With possibility to add high distinction in global history.)

### REQUIREMENTS FOR HONORS IN HISTORY

To graduate with honors in history, students must complete the concentration program; complete the courses HIS 301W, an additional 300W-level history seminar, and HIS 391W (independent study devoted to thesis preparation); have a departmental cumulative grade-point average of at least 3.7; and complete a thesis under the direction of a faculty advisor. The thesis must be of at least A– quality. Students will not receive honors for a thesis that does not meet this minimum standard. The 2-credit Honors Research Seminar (HIS 398) is encouraged.

### REQUIREMENTS FOR A MINOR IN HISTORY

The minor in history consists of a total of six courses (or 24 credit hours), including:

- A minimum of four courses (or 16 credit hours) taken from members of the history faculty, including visiting faculty with joint appointments in other departments; no more than two courses (or 8 credit hours) may come from AP credit, transfer courses, study abroad courses, or cross-listed courses taught by faculty members not associated with the Department of History.

- A minimum of one course from at least two of the following geographical areas: Africa, Asia and the Pacific, Europe, Latin America, the United States.

- A minimum of one course from each of two chronological periods: pre-1800 and 1800 to the present.

### UPPER-LEVEL WRITING REQUIREMENT

History majors fulfill the College upper-level writing requirement by taking HIS 301W (History Seminar) and a second 200- or 300-level seminar designated "W". These two seminars are included within the total of 10 courses (40 credit hours) required for the concentration in history.
COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

FOUNDATION COURSES

100. Late Antiquity and Beyond. The forging of European society from the end of the middle ages to the scientific revolution.
101. Early Europe.
102. The West and the World Since 1492. This course surveys the political, social, economic, and cultural history of Europe from the Age of Discovery to the end of the Cold War. Special emphasis is placed on European interaction with the rest of the world by way of colonization, trade, war, and immigration.
103. Cultural History of Ancient Greece. Same as CLA 102.
104. American Civilization. A study of values, institutions, and peoples that have shaped the United States, focusing on both intellectual history and popular culture.
105. Traditional Japan. Explorations in the cultural and institutional history of Japan from premodern to modern times.
106. Colonial and Contemporary Africa. Explores the impact of capitalism on African socioeconomic institutions during and after the era of formal colonialism.
110. Introduction to African-American Studies. Exploration of the images and various disciplinary approaches that have contributed to our understanding of the black family experience in America, and familiarization with the concepts and theories that inform and structure African-American studies as a discipline.

INTRODUCTORY COURSES

116. History of Poland. Gives an overview of more than one thousand years of Poland’s history as one of the main Central-East European countries.
117. History of Islam. Same as REL 107.
119. The Relativity Revolution. This course attempts to place Einstein in the context of the German history of his times (as the course dealing with Newton attempts to place him in the England of his times).
120. Introduction to Historical Studies. This course is intended for students new to the study of history at the college level. It explores what historians do, how they do it, and how students can hone their own skills.

147. Industrial America, 1865–1929. Changes in national life brought about by the sustained expansion of American industry: monopolies, labor strife, the Populist challenge, immigrants and natives, cities and their discontents, segregation, and the growing power of the national state.
148. Recent America, 1929–Present. Causes and consequences of the Great Depression, the creation of the American welfare state, the origins of the Cold War and the construction of the national security state, the crises of Vietnam and the protest movements of the 1960s, and the collapse of liberal hegemony in the 1970s.
150. Russian Civilization. Same as RUS 128.
151. Imperial Russia. This course focuses on the history of the Russian Empire from Peter the Great’s forced “Westernization” of the Russian elite (around 1700) to the collapse of the Romanov dynasty in 1917.
153. Russia Now. Same as RUS 127.
154. Russia Now. Same as RUS 126.
155. History of Russia to 1692. This course focuses on the history of Kievan Rus beginning with the official conversion to Byzantine Christianity (988), the rise of the city of Moscow to a dominant position among the Russian principalities, and Muscovite society, politics, and economics.
166. African-American History II. A continuation of the study of the black American, from 1900.
167K. Speaking Stones. Same as REL 167K.
168. The Wars of Vietnam, 1917–1980. This course examines the struggles to control Indochina among the French, Vietnamese, and Americans in the twentieth century, with special emphasis on the the consequences for the social and political life of all three peoples.
169. The Transatlantic Twenties. An introduction to the history of modern art, music, film, dance, and literature, which emerged in the context of political, social, and cultural developments in Europe and the United States during the years following World War I.
170. America Since 1945. This course offers an in-depth view of the hopes and even more the fears Americans held in the years since the Second World War.
172. Indians and Other Americans. Interactions between North American Indians and Euro-Americans from colonial times to the present, including the development of Pan-Indian movements.
176. The Campus as a Sustainable Environmental Microcosm. This course explores the historical development of campus and community energy systems in order to evaluate their economic and environmental impacts over time.
184. Modern Japan. Focus is on the modern history of Japan from 1850 into the 1990s, with emphasis on the transformation of Japan from a traditional into a modern, industrial society.

QUEST COURSES

196. Germany Between East and West. Examines the history of post–WWII Germany from the perspective of its unique geopolitical position, stranded in the middle of the Cold War confrontation between capitalist West and communist East.
198. History of the Book in the West. Discover the treasures in the Rush Rhees Library’s Rare Book and Manuscript Collection and learn how to analyze them in their historical context. Students study how to read the format and design of medieval manuscripts and later publications as well as how print affected European politics and society, particularly during the first three centuries after Gutenberg.

ADVANCED LECTURE COURSES

200. Introduction to Archaeology. Same as AH 106.
201. The Third World. The origins of colonization and “underdevelopment” in the rise of European capitalism.
203. Economics and Societies in Latin America and the Caribbean Since 1492. Same as ECO 252/AAS 252.
204. Introduction to Law: History of Federal Indian Law. Introduction to legal studying, reasoning, and writing with the field of American Indian Law being the focus.
205. Europe Since 1945. The principal actors, forces, and currents in world politics from Hitler’s failure to take Moscow and the attack on Pearl Harbor to the present.
206. The Holocaust. This course focuses on the history and interpretation of the Holocaust, that is the state-sponsored persecution and murder of approximately six million Jews, as well as other people perceived to be racially inferior, by the Nazi regime and its collaborators. The course covers not only the origins of the orders to murder the Jews and the carrying out of those orders, but the evolution of relations between Jews and non-Jews in Europe as well as the distinctive history of Germany within Europe.
207. Intellectual History of Science. A study of intellectual continuity and change in science focused on “revolutionary” episodes from the sixteenth to the twentieth century.
208. Health, Medicine, and Social Reform. Pursuit of the theme of public health and medical reform in leading writers, from different positions along the political spectrum, committed to the social and economic reorganization of modern society.
209. Changing Concepts of Health and Illness. Historical account of the way disease has been conceived in the Western tradition.

211. History from Myth: King Arthur and Robin Hood. Medieval stories about kingship, ideas of chivalry, socioeconomic oppression and resistance, the growth and functioning of early legal systems within the context of their historical periods.

215. The Enlightenment. Study of some of the major changes in thought in Europe in the eighteenth century with emphasis on the social and economic conditions underlying such changes.

219. Romanesque Europe. Same as AH 238.

223. Modern France. A political, social, and cultural history of France from eighteenth-century debates over the Enlightenment and the French Revolution to twenty-first-century debates over topics such as historical memory, national identity, the integration of immigrants, and the future of the European Union.

225. Germany and Austria, 1800–1914. The rise of the Prussian power-state, Bismarck’s “unification” of Germany through blood and iron, and Germany’s grasp at world power to August 1914.

226. Hitler’s Germany, 1914–1945. Germany in World I, the collapse of the Weimar Republic, National Socialism from beer hall to European hegemony, and the destruction of German unity.

231. British History to 1485. Combines various approaches to Medieval Britain—political, economic, social, cultural—and concentrates on the creation of a distinct High Medieval Civilization in England in the twelfth through the fourteenth centuries, after the Roman collapse, and Germanic and Viking invasions.

233. Nineteenth-Century European Thought. This course considers the development of European philosophical, political, religious, and aesthetic thought from the late eighteenth century to the late nineteenth century.

234. Twentieth-Century European Thought. An introduction to the main currents of European thought in the twentieth century—what historian Eric Hobsbawm has rightly termed the “Age of Extremes.”

237. England and Ireland Since 1800. This course traces the course of England’s slow, colorful decline through the late-nineteenth and twentieth centuries.

243. Dangerous Texts: Literature and Politics in Russia. Same as RUS 289.

245. The City in American History. This course examines both the ideals of planners, reformers, and immigants who viewed the city as a center of their utopian dreams, and the racial prejudice, concentrations of wealth, and political corruption that have undermined cities from colonial times to the present.

249. The Civil War. This course examines the events that led to the Civil War and the war’s impact on the nation’s political, social, and economic order.

250. Women in History, United States, 1600–1970. This course surveys the historical experiences of American women from the era of colonization in the seventeenth century through the feminist movement of the 1970s.

252. Cultural History of the United States, 1876–Present. The complex reactions of Americans to a world in which science, urban living, and the impersonal relations characteristic of large-scale organizations constitute a major shaping role.


255. Economic and Social Conditions of African Americans in the Twentieth Century.

258. History of Race in America. This course attempts to identify salient moments in the nation’s history when race was used as an organizing principle in the construction of American public and private institutions.

262. Gender and Representation in Native American Art. Same as AH 276.

263. The Arts in American Culture. Same as AH 255.


273. The Making of the Modern Middle East. An introduction to the economic and political history of the Middle East since the early nineteenth century. This course provides a context for understanding the U.S. invasion of Iraq in 2003.

278. Contemporary Japanese Culture. Same as JPN 246.

279. Japan at War and After. This course covers the period from 1937 to the 1960s and will focus on Japan’s participation in the Pacific War, the social and cultural impacts of the war, and the social and cultural transformation of Japan in the postwar era.


282. The Samurai. The origins, image, mythology, and history of the Japanese Samurai using history, literature, and film.

289. History of European Exploration. Explores the effects of geographical exploration in the eighteenth and early nineteenth centuries on the nature of knowledge about what is distant, unseen, or remote from our own experience by examining case studies of expeditions such as those of Lewis and Clark, James Cook, and Alexander von Humboldt.

296. Women in East Asia. A history of women in the family, women and work, and women in society in three East Asian cultures.

298. Music-Made America. Seminars centered around major figures in the history of American popular music, using their work as a way into the cultural history of their times.

THE HISTORY SEMINAR
All HIS 301 courses carry upper-level writing credit.

301W. The History Seminar. The History Seminar is a course designed for history majors (ordinarily juniors), but open to all students. Consisting of a variety of seminars on selected topics, the course is designed to provide students with the foundation for historical research and writing. The principal requirement of the course is a substantial research paper (15–20 pages). Readings vary with the seminar.

ADVANCED SEMINARS
Advanced readings and discussion courses (HIS 302–349) provide students with the opportunity to read extensively on a limited topic and explore important historical questions in discussions and papers. Advanced research seminars (HIS 350–389) enable the student to engage in independent research and to present this research in a substantial essay.

ADVANCED SEMINARS: READINGS AND DISCUSSION
All HIS 300-level seminars carry upper-level writing credit.

303W. Maritime History of the Atlantic World. This course studies European expansion into Africa and the Americas between the ages of Discovery and Revolution by focusing on the Atlantic Ocean as the geographic center of an expansive network of the maritime connections. The course is primarily concerned with the lives and activities of thousands of mariners who were catalysts in identity formation, migration, and economic development.

304W. The Beats and Beyond. This course explores the contradictions of the 1950s through an examination of social, political, and cultural history. The course also explores the complexity of the decade through fiction, autobiography, film, and music.

305W. American Health Policy and Politics. Provides an understanding of the principal health institutions and their behavior.

306W. European Cultural History. Selected themes in the study of European popular culture(s) during the early modern and modern periods (sixteenth to twentieth centuries).

310. World War II: Eastern Front. This course covers the history of the Soviet Union’s struggle with Nazi Germany from 1941 to 1945, the largest and bloodiest military conflict in human history.

314. International Human Rights. This course has three goals: (a) to study the history of human rights, (b) to analyze a series of contemporary conflicts over human rights, and (c) to explore the range of moral, philosophical, and political questions that emerge as a result.
318W. Nationalism and Ethnic Conflict in Modern Europe, 1800–2000. This course focuses on the history of European nations as political, economic, and cultural entities, and the challenges, to these nations, posed by migration, political upheaval, various forms of ethnic identification, and ethnic conflict.

319W. A Historic Perspective on the Economic, Institutional, Legal, and Geopolitical Aspects of Globalization. Exploration of the existing concepts through which the system operates, all in the overall context of the history of world trade.

333W. U.S. Colloquium I. Surveys the historiography of colonial and antebellum America.

334W. U.S. Colloquium II. Explores the major interpretations of American history from Reconstruction to the late twentieth-century resurgence of conservatism.

335W. American Thought. Selected topics in American thought, treating the work of intellectuals in its social, political, and cultural context.

343. Race and the American City. Race has played a major role in defining the physical, cultural, and political environment of American cities. This course explores the role of race in urban history in the nineteenth and twentieth centuries.

ADVANCED SEMINARS: RESEARCH

350W. Topics in Medieval History. Selected problems in the political, social, and intellectual history of the Middle Ages.

356W. The Atlantic Slave Trade, 1650–1850. The extent to which the Atlantic slave trade retarded the development of capitalism in Africa between 1650 and 1850, and so created the conditions for the imposition of European colonial domination.

357W. Evolution of the World Economic Order Since 1500. Deals with the economic relations between the developed and less developed parts of the world since the sixteenth century with attention given to the impact of slavery and the slave trade. Same as AAS 371/ECO 371.

360W. War, Money, and Ordinary People: Topics in European History, 1648–1789. This course covers topics such as the changing nature of warfare, the lives of ordinary people, how the state attempted to control their private lives. It also looks at the global world which had emerged along with the growth of national feeling.

367W. Topics in Modern German History. Examines important problems in the social and political history of modern Germany.

374. Rochester and Its Radicals. This course examines the remarkable history of the city of Rochester and its environs as a site of radical thought and activism. In common readings and discussions, attention is centered on the work of five local dissidents—Frederick Douglass, Susan B. Anthony, Walter Rauschenbusch, Howard Coles, and Christopher Lasch—trying to weave together the story of their careers with that of the city in which they made their home at one time or another. These figures, all of whom have papers in local repositories, are the subjects of individual student research papers.

377W. Topics in Early American History. This seminar introduces students to recent scholarship in the study of early America.

384. Urban Change and City Politics. Same as PSC 241W.

385W. Guns, War, and Revolution in Southern Africa. Explores the conditions that created the guerrilla movements through which southern Africa liberated itself, and how the struggles reshaped the history of the region and its position in the global economy.

INDEPENDENT STUDY AND RESEARCH

300. Study Abroad. The department participates in programs of study abroad. Complete details of these programs may be obtained from the Center for Study Abroad in 206 Lattimore Hall and/or the department advisor.

391W. Independent Study. Designed for junior and senior students who wish to pursue an independent reading program with a professor; required for honors program participants. Upper-level writing credit awarded if students prepare and revise an extended essay.

393. Senior Project. For seniors writing an extended essay under faculty supervision.

394. Internship in History. Experience in an applied setting supervised on site. Approved and overseen by a University instructor.

396W. History Tutorial. The course involves intensive study of a topic in a special format. Each class consists of two students and a professor who meet once a week for an hour. For every class meeting, one of the students presents a short, analytical paper on assigned reading while the other student acts as a respondent; the role of the instructor is to guide and comment but not to lecture. The course satisfies the upper-level writing requirement.

398. Honors Research Seminar. Credit—2 hours. A forum in which students can present preliminary versions of their theses and get critical feedback from both their student colleagues and the instructor.

INTERDEPARTMENTAL DEGREE PROGRAMS

Students whose educational interests do not fall within one of the existing departmental concentrations have opportunities for special degree programs through the College Center for Study Abroad and Interdepartmental Programs. In addition, the Center administers study abroad programs.

INTERDISCIPLINARY STUDIES

The College Center for Study Abroad and Interdepartmental Programs enables students to pursue educational goals that lie outside traditional disciplines and departments. Through its faculty Committee on Individualized Interdepartmental Programs, it supervises specially constructed programs leading to the B.A. degree. These include programs tailored to the specific needs of the individual student. In recent years these individualized concentrations have included such diverse areas as Italian studies, law and society, and cultural studies.

COLLEGE CENTER FOR STUDY ABROAD AND INTERDEPARTMENTAL PROGRAMS

CENTER STAFF

Richard Feldman, Ph.D. (Massachusetts) Dean of the College; Professor of Philosophy
Jacqueline L. Levine Assistant Dean and Director
Heidi Kozireski Counselor
Glenn C. Cerusaleti Counselor
Emily Riegel Administrator

COMMITTEE ON INDIVIDUALIZED INTERDEPARTMENTAL PROGRAMS

Celia Applegate, Ph.D. (Stanford) Professor of History
Thomas DiPiero, Ph.D. (Cornell) Professor of French and of Visual and Cultural Studies
Udo Fehn, Ph.D. (Technical University of Munich) Professor of Geology; Chair of the Committee
Suzanne J. O’Brien, B.A. (Rochester) Associate Dean of Undergraduate Studies and Director of the College Center for Academic Support

INTERDISCIPLINARY STUDIES
The bachelor’s degree with distinction is awarded to students with a sufficiently high major grade-point average: 3.25 for distinction, 3.50 for high distinction, and 3.75 for highest distinction.

It is possible for students to earn the degree with both distinction and honors.

NOTE: Proposals for concentrators must be submitted by April 1 or November 1. Proposals will not be accepted after November 1 of the senior year.

INTERNATIONAL RELATIONS

COMMITTEE ON INTERNATIONAL RELATIONS CERTIFICATE PROGRAM

William B. Hauser, Ph.D. (Yale)  Professor of History
Randall Stone, Ph.D. (Harvard)  Associate Professor of Political Science; Chair of the Committee

The International Relations Certificate Program provides students with an opportunity to develop an interdisciplinary knowledge of international relations. Those interested in the program should put together a program that includes 10 courses:

1. Two courses in economics, two courses in history, and two courses in political science from among those listed under the heading, Primary Courses.
2. Four courses from either the Primary Courses or Secondary Courses list, or four substitute courses approved by the student’s International Relations Program faculty advisor, of which up to two may be foreign language courses beyond 105.

In addition:
1. No primary course may be taken satisfactory-fail and no more than one secondary course may be taken satisfactory-fail.
2. Students must earn an overall grade-point average of at least 2.0 in courses submitted for the program.

The International Relations Certificate Program is administered through the College Center for Academic Support and Interdepartmental Programs, located in Lattimore Hall. Further information about the program is available in 312 Lattimore Hall.

NOTE: Some courses are offered only in alternate years. Information about current offerings is available in 312 Lattimore Hall.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings. Students should consult Professor Stone about courses offered each year by the Skalny Center for Polish and Central European Studies and about courses taken on the British or European Semesters, some of which may be counted towards the International Relations Certificate.

PRIMARY COURSES

ECONOMICS

With the exception of ECO 108, all economics courses have prerequisites.

ECO 207. Intermediate Microeconomics.
ECO 269. International Economics.
ECO 270. International Finance.
ECO 272. International Political Economy.
ECO 273. Economic Growth and Development.

HISTORY

HIS 106. Colonial and Contemporary Africa.
HIS 148. Recent America, 1929–Present.
HIS 151. History of Imperial Russia.
HIS 152. Stalin’s Russia.
HIS 170. America Since 1945.
HIS 183. Modern China, 1600–Present.
HIS 184. Modern Japan.
HIS 201. The Third World.
HIS 205. Europe Since 1945.
HIS 223. France, since 1870.
HIS 225. Germany and Austria, 1866–1914.
HIS 237. England and Ireland Since 1800.
HIS 238. History of British India.
HIS 240. Russian Women—Past and Present.
HIS 265. America and the Good War.
HIS 290. The Cistercians (the White Monks)
HIS 302. The West and the World.
HIS 320. The German Problem.
HIS 344. North Africa and the Middle East in the Age of Imperialism.
POLITICAL SCIENCE
PSC 106. Introduction to International Relations.
PSC 271. Russia and Eastern Europe: Politics and International Relations.
PSC 272. Theories of International Relations.
PSC 274. International Political Economy.
PSC 377. Perspectives on War and Peace.

SECONDARY COURSES
A list of Secondary Courses is available in the College Center for Academic Support, 312 Latimore Hall.

JUDAIC STUDIES
The Center for Judaic Studies aims to bring together faculty and students from across the University for collaborative study of Jews and Judaism in historical and cultural perspective. Judaic studies courses are offered in modern Hebrew, religion, and history, as well as other areas. For further information about offerings in Judaic studies, see the Department of Religion and Classics.

LINGUISTICS
James F. Allen, Ph.D. (Toronto)  John H. Des-sauer Professor of Computer Science, Pro-fessor of Linguistics and of Brain and Cog-nitive Sciences
Gregory N. Carlson, Ph.D. (Massachusetts) Professor of Linguistics, of Philosophy, and of Brain and Cognitive Sciences
Michael K. Tanenhaus, Ph.D. (Columbia) Professor of Brain and Cognitive Sciences, of Psychology, and of Linguistics
Joyce M. McDonough, Ph.D. (Massachusetts) Associate Professor of Linguistics and of Brain and Cognitive Sciences; Chair of the Department
Jeffrey T. Runner, Ph.D. (Massachusetts, Amherst) Associate Professor of Linguistics and of Brain and Cognitive Sciences
Ted R. Supalla, Ph.D. (California, San Diego) Associate Professor of Brain and Cognitive Sciences and of Linguistics
Christine A. Gunlogson, Ph.D. (California, Santa Cruz) Assistant Professor of Linguistics
Charles M. Carlton, Ph.D. (Michigan) Professor Emeritus of French and Romance Linguis-tics
Demetrius Moutsos, Ph.D. (Chicago) Professor Emeritus of Linguistics
Stanley M. Sapon, Ph.D. (Columbia) Professor Emeritus of Psycholinguistics

Requirements for Minors

LINGUISTICS

101. People and Their Language. This is an introductory overview of the relationship between people and language. The course focuses on how historical, social, and cognitive factors influence language.

102. Language and Social Identity in the United States. This course examines the relationships between language and social diversity in the general American speech community. Same as AAS 102.

103. Language and Sexuality. This course investigates various aspects of language as used by members of sexual minority groups, focusing on language of and about gay men and lesbians, including “reclaimed epithets” (e.g., “dyke” and “queer”), gender vs. sexual-ity vs. sex, and the role of language in creating/maintaining sexual categories and identities. Same as WST 103.

104. Language and Culture. Same as ANT 203.

105. Language in Advertising. The course examines the use advertisers make of language in selling their products and how it affects our perceptions of the product and ourselves. Same as FS 257F.

106. Linguistics and the Law. This course examines the application of linguistic analysis to legal issues and practices—a growing field known as forensic linguistics.

108. Topics in Translation Studies. Translation problems and strategies are illustrated with examples from a variety of languages. The role of the translator and different types of translation (literary, technical, intra-lingual, interlingual, intersemiotic) are examined. (Summer)

110. Introduction to Linguistic Analysis. This course investigates the structure of human language, covering the basic techniques and concepts in the subfields of contemporary linguistic analysis. The course emphasizes work in primary material and data analysis, and focuses on developing skills in data collection and defining relevant questions for the purpose of seeking evidence that will bear on resolving theoretical and empirical questions in analysis of language. Same as ANT 110. (Fall and Spring)


162. Understanding Reading. Same as BCS 162. (Fall)
205. Historical Linguistics. Examination of language change through time.
206. History of the English Language. Same as ENG 200.
207. Old English Literature—On a Dark Track. Same as ENG 201.
208. Language Development. Same as BCS 259.
210. Introduction to Language Sound Systems. Introduces students to the principles underlying sound systems in human language. Attention is given to articulatory phonetics, with some discussion of acoustic phonetics; practice in the production, recognition, and transcription of sounds in various languages of the world, and to the fundamentals of phonological analysis and argumentation through hands-on investigation of language sound systems. Prerequisite: LIN 110.
217. Language and Psycholinguistics. Same as BCS 260. (Fall)
218. Language and the Brain. Same as BCS 265.
219. Philosophy of Language. Same as PHL 247. (Spring)
220. Introduction to Grammatical Systems. This course examines the grammatical structure of words and sentences from the standpoint of modern linguistic theory.
225. Lexical Semantics. This course is an introduction to the study of word meaning. It covers various theories of the structure of words, the differences and similarities in lexical semantic structure between different languages, and the relationship of word meaning to sentence meaning and syntax.
226. Morphology. This course examines the structure and definition of the linguistic unit ‘word,’ its typology, and the relationship of the morphological component to other levels in the grammar. The course includes an introduction to analytical techniques developed by various schools of linguistics with emphasis placed on an examination of data from a range of languages based on both published descriptions and primary field data. We examine the properties of words and how they fit into the larger structure of linguistic knowledge, the relationship between words and syntactic structure (e.g., phrases and sentences) and the relationship between words and phonological structure (e.g., phonological rules and prosodic structure). (Fall)
227. Topics in Phonetics and Phonology. The course provides participants with an overview of areas of phonological and phonetic theory encapsulated in the laboratory phonology research strategy. These issues are metrical phonology, motivating constraint based versus procedural grammars, and phonology-phonetics interfaces. The emphasis is to provide participants with the background to read articles in phonological and phonetic theory. Course requirements for the phonology section are problem sets and/or the gathering and analysis of real speech data exemplifying an experimental or laboratory approach to phonological theory/analysis or phonological generalizations. Prerequisites: LIN 110, 210.
230. Signed Language Structure. Same as BCS 264.
235. Sign Language Universals. Same as ASL 235.
241. Language Use and Understanding. Same as BCS 261.
247. Natural Language Processing. Same as CSC 247.
248. Speech Recognition and Statistical Language Models. Same as CSC 248.
260. Syntactic Theory. This course picks up where LIN 220 leaves off, exploring topics in natural language syntax from a cross-linguistic perspective. The goal of the course is an approach to syntax that accounts for both language-particular as well as universal constraints on language. Among the topics studied are phrase structure, constraints on coreference (binding), thematic roles, long- and short-distance dependencies (extraction and NP movement), constraints on unexpressed phrases (trace and control theory), and quantifier scope (logical form). Prerequisite: LIN 220.
261. Phrase Structure Grammars. This syntactic theory course examines syntactic phenomena from the perspective of phrase structure and lexicalist grammar as opposed to transformational grammar. The course examines and develops phrase structure grammar (specifically head-driven phrase structure grammar) approaches to standard syntactic problems, contrasting them where appropriate with transformational approaches. No background in non-transformational approaches is assumed. This course can be taken as LIN 261 or as LIN 461 and is meant for linguistic majors and nonmajors alike. Prerequisite: LIN 220.
265. Formal Semantics. This course is an in-depth introduction to the formal analysis of natural language meaning, employing techniques that have been developed in language and formal philosophy over the last century.
266. Pragmatics. This course investigates how linguistic meaning—the meanings of words and sentences—relates to what speakers actually convey when they use language to communicate. Topics include the role of context in determining meaning; truth-conditional and other types of meaning; presupposition; implicature and Grice’s Cooperative Principle; anaphora; information structure; speech acts and their relation to sentence types. Prerequisite: LIN 110.
267. Topics in Syntax and Semantics. This course covers topics at the interface of syntax and semantics. No specific syntax or semantics background is required, though the equivalent of LIN 220 is recommended.
389. Senior Seminar. Credit—2 hours.
391. Independent Study in Linguistics.
393. Senior Project.

MANAGEMENT STUDIES

The College, in consultation with the William E. Simon Graduate School of Business Administration, offers a Certificate in Management Studies, administered through the College Center for Academic Support and supervised by a faculty committee. Students who wish to enroll in the program should pick up an application in the Center, which is located in 312 Lattimore Hall. Ordinarily, students should apply by November 1 of their senior year.

COMMITTEE ON MANAGEMENT STUDIES

Richard Feldman, Ph.D. (Massachusetts) Dean of the College; Professor of Philosophy
Ronald Hansen, Ph.D. (Chicago) Associate Dean of Academic Affairs; William E. Simon Graduate School of Business Administration
Thaddeus E. Pawlicki, Ph.D. (SUNY, Buffalo) Lecturer in Computer Science
Poduri S. R. S. Rao, Ph.D. (Harvard) Professor of Statistics and of Biostatistics; Director of the Program in Statistics
Michael Wolkoff, Ph.D. (Michigan) Senior Lecturer in Economics and Chair of the Committee

REQUIREMENTS FOR A CERTIFICATE IN MANAGEMENT STUDIES

For certification, students must complete the six management courses with a minimum GPA of 2.5. No course may be taken on the S/F option; ordinarily, no transfer credit without preapproval for specific courses is allowed, although students may petition for transfer credit just as they may for the substitution of specific courses in their chosen track.

Six courses are required:
1. STT 211, 212, 213 (prerequisite for STT 213, MTH 141), 216, or ECO 230
2. CSC 108, CSC 170, CSC 171, or ECE 114
3. ECO 108. Principles of Economics
4. ACC 201. Principles of Accounting
5. Two courses from one of the following tracks:
a. Accounting/Finance:
   • ACC 221. Cost Accounting
   • FIN 205. Financial Management
   • ECO 216. Financial Markets: Concepts and Institutions
   • ECO 211. Money, Credit, and Banking
   • ECO 217. Financial Markets: Theory and Evidence
One of the two courses for this track must be from the Simon School.
This track emphasizes principles and skills appropriate for students seeking careers with banks, investment firms, benefits offices, and other places that analyze and record business transactions. Students may wish to supplement their work with other courses in financial theory or public economics. ECO 263 and 265 are recommended for additional coursework.

b. Information Systems:

- CIS 225. Data Management
- CSC 172. Data Structures

This track prepares students to make sound business decisions regarding the use of computer technology. This understanding is achieved through a survey of computing topics including hardware and software, programming, systems analysis, and information management with emphasis on practical applications in the business environment.

c. Marketing:

- MKT 203. Principles of Marketing (required)
- MKT 213. Marketing Projects and Cases
- ECO 251. Industrial Organization
- STT 211W. Sampling Techniques

This track emphasizes principles and skills related to the distribution and sale of goods and services appropriate for students seeking careers in sales, marketing research, consumer relations, and other areas having to do with marketing goods and services.

d. Personnel Management:

- BSI 241. Fundamentals of Personnel Administration
- ECO 223. Economics of the Labor Market
- PSY/CSP 262. Human Motivation and Emotion
- PSY/CSP 264. Psychology of Business and Industry

This track offers a flexible introduction to concepts and skills appropriate for students seeking careers in areas such as personnel relations, benefits counseling, public relations, and staff recruiting.

e. Production:

- OMG 231. Operations Management (required)
- BCS/PSY 228. Human-Machine Interface
- MTH 208. Methods of Operations Research

This track emphasizes principles and skills of production analysis appropriate for students seeking careers in production planning, quality control, inventory management, and other jobs involving managing the production of goods and services.

f. Public Sector Analysis

- LAW 205. Business Law
- ECO 236. Health Policy
- ECO 261. State and Local Public Finance
- ECO 263. Public Finance
- PSC 257. Domestic Social Policy
- PSC 245. Aging and Public Policy

This track emphasizes principles and perspectives appropriate for students seeking jobs involving natural resources, government regulations, and relations between various agencies.

Students also have the option of completing two courses from different tracks for a Certificate with a General Studies designation.

Upon graduation, students successfully completing the management studies program receive a certificate in their departmental diploma ceremony.

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**MATHMATICAL MODELING IN POLITICAL SCIENCE AND ECONOMICS**

*COMMITTEE ON MATHEMATICAL MODELING IN POLITICAL SCIENCE AND ECONOMICS*

Sanford L. Segal, Ph.D. (Colorado) Professor of Mathematics and of History; Chair of the Committee

William Thomson, Ph.D. (Stanford) Professor of Economics

Mark Fey, Ph.D. (Caltech) Associate Professor of Political Science

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**CERTIFICATE PROGRAM**

Long a domain of the natural and applied sciences, the use of mathematical techniques has gained growing acceptance in fields like political science, economics, business, and psychology. Departments in the University of Rochester have made numerous contributions to the increasingly mathematical aspects of their fields and are uniquely positioned to teach students who wish to focus on the uses of mathematics in the social sciences. This program draws on classes in economics, mathematics, and political science. Ordinarily, interested students should apply by spring semester of their junior year.

Students must fulfill all five of the requirements noted below with a minimum overall grade point average of 2.0. No course used to satisfy these requirements may be taken satisfactory/fail.

4. Social Science Applications (3 courses): Three additional courses in political science and economics from the Courses of Instruction listed below, with at least one from each department.
5. Additional mathematics (or social science) course (1 course): Students who select MTH 203 (for statistics) and MTH 217 (for modeling) are required to take an additional social science application course rather than an additional mathematics course. All other students take an additional mathematics course from the Courses of Instruction listed below.

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**COURSES OF INSTRUCTION**

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

**MATHEMATICS**

164. Multivariable Calculus.
201. Introduction to Probability.
235. Linear Algebra.
240. Introduction to Topology.
290. Modeling Analysis and Optimization.

**ECONOMICS**

207. Microeconomics.
209. Macroeconomics.
220. Fair Allocation.
231. Econometrics.
256. Game Theory and Social Choice/Topics in Game Theory.
273. Economic Growth and Development.
274. Mathematical Economics.
282. Introduction to Positive Political Theory.
288. Introduction to Game Theory.

**POLITICAL SCIENCE**

272. Theories of International Relations.
281. Introduction to Positive Political Theory.
288. Introduction to Game Theory.

The following graduate courses are open to advanced undergraduates with permission of the instructor.

403. Mathematical Modeling.
404. Introduction to Statistical Methods.
580. Positive Political Theory.
MATHEMATICS

Frederick R. Cohen, Ph.D. (Chicago) Professor of Mathematics
Alfred Clark, Jr., Ph.D. (M.I.T.) Professor of Mechanical Engineering, of Mathematics, and of Biomedical Engineering
Michael E. Gage, Ph.D. (Stanford) Professor of Mathematics
Steven M. Gonek, Ph.D. (Michigan) Professor of Mathematics; Chair of the Department
Allan Greenleaf, Ph.D. (Princeton) Professor of Mathematics
John R. Harper, Ph.D. (Chicago) Assistant Professor of Mathematics
Richard B. Lavine, Ph.D. (M.I.T.) Professor of Mathematics
Saul Lubkin, Ph.D. (Harvard) Professor of Mathematics
Carl Mueller, Ph.D. (California, Berkeley) Professor of Mathematics
Douglas C. Ravenel, Ph.D. (Brandeis) Daniel Burton Fayerweather Professor of Mathematics
Sanford L. Segal, Ph.D. (Colorado) Professor of Mathematics and of History
Naomi Jochnowitz, Ph.D. (Harvard) Associate Professor of Mathematics
Jonathan Pakianathan, Ph.D. (Princeton) Associate Professor of Mathematics
Dan Geba, Ph.D. (Princeton) Assistant Professor of Mathematics
Dimitri Gioev, Ph.D. (Royal Institute of Technology, Stockholm) Assistant Professor of Mathematics
C. Douglas Haessig, Ph.D. (California, Irvine) Visiting Assistant Professor of Mathematics
Robert Hladky, Ph.D. (Washington) Visiting Assistant Professor of Mathematics
Paul Pearson, Ph.D. (Northwestern) Visiting Assistant Professor of Mathematics
Sema Sahin, Ph.D. (Michigan State) Assistant Professor of Mathematics
Shannon Starr, Ph.D. (California, Davis) Assistant Professor of Mathematics
Thomas Tucker, Ph.D. (California, Berkeley) Assistant Professor of Mathematics
Brigitta Vermesi, Ph.D. (Cornell) Visiting Assistant Professor of Mathematics
Norman L. Alling, Ph.D. (Columbia) Professor Emeritus of Mathematics
Samuel Gitler, Ph.D. (Princeton) Professor Emeritus of Mathematics
Johannes H. B. Kemperman, Ph.D. (Amsterdam) Daniel Burton Fayerweather Professor Emeritus of Mathematics
Joseph Neisendorfer, Ph.D. (Princeton) Professor Emeritus of Mathematics
Arnold K. Pizer, Ph.D. (Yale) Professor Emeritus of Mathematics
David D. Prill, Ph.D. (Princeton) Professor Emeritus of Mathematics

Ralph A. Raimi, Ph.D. (Michigan) Professor Emeritus of Mathematics
Norman Stein, Ph.D. (Cornell) Professor Emeritus of Mathematics
Dorothy Maharam Stone, Ph.D. (Bryn Mawr) Professor Emeritus of Mathematics
Charles E. Watts, Ph.D. (California, Berkeley) Professor Emeritus of Mathematics

Teaching assistants are used to supervise recitation and review sections of first- and second-year courses.

The Department of Mathematics offers the B.A., B.S., M.A., M.S., and Ph.D. degrees. The department also offers a minor in mathematics.

Mathematics today is one of the most pervasive modes of thought—indeed a striking intellectual phenomenon of the past several decades is the use of mathematics in fields far removed from the traditional ones of the physical sciences and engineering. Some of this mathematics is “new,” invented by mathematicians and others for the purpose of mathematical study of a new field, as, for example, mathematical game theory and economics; some of it depends on new technology, as with computerized taxonomy or mathematical simulation of biological systems; some of it is “old” mathematics, finding new uses, such as the mathematical study of epidemics and birth-and-death processes. Mathematics has even found applications in fields as seemingly remote as political science and anthropology. In turn, each new area of application is an additional stimulus to mathematics itself. The offerings of the Department of Mathematics are intended to reflect this diversity.

Students planning to concentrate in almost any of the University’s liberal arts programs, in addition to those that require some college mathematics, will find one or more courses or sequence offerings in the Department of Mathematics a valuable complement to their field of interest. Students are urged to consult the departmental advisors of both mathematics and their own intended area of concentration about courses in mathematics that may be useful for their educational and career goals, and to begin the necessary or recommended courses as early as possible.

More detailed and current information can be found on the department’s Web page www.math.rochester.edu.

COURSE INFORMATION

There are three first- and second-year sequences in calculus:
- Students in the physical and engineering sciences normally choose the sequence MTH 161, 162, 164, 165. These courses are offered every semester.
- The sequence MTH 141, 142, 143, 144, 145 is intended for students who require a less fast-paced calculus sequence than MTH 161, 162. The three courses MTH 141, 142, 143 contain all of the material of MTH 161, 162 and prepare students for MTH 164 and 165. These courses are offered every semester.

MTH 164 and 165 may be taken in either order. Usually MTH 164, Multidimensional Calculus, is taken first since its subject matter is more closely related to MTH 162. However, some engineering majors require MTH 165, Linear Algebra with Differential Equations, to be completed by the end of the fall semester of the sophomore year. Other departments require MTH 165, Ordinary Differential Equations, instead of MTH 165.

- The sequence 171, 172, 173, 174 is an honors calculus sequence for talented students interested in mathematics. The sequence emphasizes the theoretical understanding of calculus in addition to teaching technical skills. Five credits will be granted for each course satisfactorily completed instead of the usual four credits. Mathematics concentrators who complete all four semesters will be excused from the requirement to take MTH 235. A high school AP calculus course or consent of the department is required to register for MTH 171.

Both the MTH 161–164 and MTH 171–174 sequences may be entered with advanced standing and/or credit by students who do sufficiently well on a College Entrance Examination Board advanced placement exam.

Care is taken to ensure correct placement in the appropriate mathematics sequence during freshman orientation. Placement is based upon high school background and national placement tests. In addition, once classes have begun, students may choose, or the instructors may advise, transfer to a more suitable sequence when considered appropriate.

MTH 130 is an introductory course especially recommended for students intending to pursue concentrations in the humanities.

The two-course sequence MTH 140A–140B covers all the material in MTH 141 together with a thorough presentation of the standard precalculus material.

Finally, as part of the Quest program in the College, the department offers Quest versions of MTH 161 and 162. The Quest versions of these courses fully prepare students for higher-level courses and are especially recommended for interested students.

CONCENTRATION PROGRAMS

The department offers the following undergraduate degrees: B.A. in mathematics, honors B.A. in mathematics, B.S. in mathematics, and B.S. in applied mathematics. There is also a joint concentration program in mathematics and statistics, details of which are given under the program in statistics. In addition, there is the minor in mathematics and the Certificate Program in Mathematical Modeling in Political Science and Economics.

THE B.A. IN MATHEMATICS

A set of foundational courses must be completed before acceptance into the concentration. The concentration requires eight courses of which three are core courses and
Courses that employ mathematical language for careers in science, engineering, computer science, or at least two of which are at the graduate level. Any mathematics course numbered 200 or above (except for courses used to satisfy the core course requirement) qualifies as an advanced mathematics course. Any mathematics course numbered 400 or above qualifies as a graduate-level course.

### The B.S. in Mathematics

A set of foundational courses must be completed before acceptance into the concentration. The concentration requires 11 courses of which five are core courses and six are advanced courses. In addition, students must satisfy the upper-level writing requirement.

### Foundational Course Requirement

The following foundational courses must be completed before acceptance into the concentration:

- MTH 161. Calculus IA
- MTH 162. Calculus IIA
- MTH 164. Multidimensional Calculus
- MTH 165. Linear Algebra with Differential Equations

Equivalent courses may be substituted for the above. For example, any of the mathematics honors courses MTH 171, 172, and 174 may be substituted for the equivalent MTH 161, 162, and 164 courses, and MTH 173 may be substituted for MTH 165. The sequence MTH 141–143 may be substituted for the sequence MTH 161–162. Credit granted for AP courses may be used to satisfy foundational requirements.

### Core Course Requirement

Students must complete the following five courses. An honors version of a course can always be substituted for the listed course.

1. MTH 235. Linear Algebra
2. One of MTH 236, 240. Introduction to Algebra, Topology
3. One of MTH 201. Introduction to Probability, MTH 255. Ordinary Differential Equations 1
4. MTH 282. Introduction to Complex Variables with Applications
5. MTH 285. Methods of Applied Mathematics

### Advanced Course Requirement

In addition to the core courses, students must complete five advanced courses as follows:

- Three advanced mathematics courses:
  - Any mathematics course numbered 200 or above (except for courses used to satisfy the core course requirement) qualifies as an advanced mathematics course.

- Two additional advanced courses with substantial mathematical content:
  - Courses that employ mathematical language, reasoning, or methodology qualify. Any mathematics course numbered 200 or above qualifies, as do certain nonintroductory courses in other departments. The most common courses in other departments that qualify are courses of a quantitative nature from the social and physical sciences, engineering, computer science, or statistics, but there are other possibilities. Selections must be approved by the student’s departmental advisor.

### Sample Programs and Advice

Students intending graduate work in mathematics should consider MTH 236, 237, 240, 265, 282, and suitable 400-level graduate courses as electives. Students who plan to use mathematics in a physical science or engineering are urged to consider MTH 201, 255, 281, and 282 as electives. Students intending graduate work in economics, business administration, or operational mathematics, or work in a field such as systems analysis, are urged to consider MTH 201, 202, 208, and 210. The courses constituting a concentration in mathematics do not exhaust the student’s time in the junior and senior years. Prospective graduate students in mathematics would do well to learn to read a foreign language (French, German, or Russian). Other mathematical careers might involve a background in areas such as physics, biology, engineering, economics, or computer science.

Following are some typical examples of concentration programs. These are intended as suggestive, not prescriptive.

1. Pure mathematics intending graduate study: MTH 201, 235, 236, 240, 265, 282, plus one additional 200-level course.

### The Honors B.A. in Mathematics

A set of foundational courses must be completed before acceptance into the concentration. The concentration requires seven courses of which three are core courses and four are advanced courses. At least two of the advanced courses must be at the graduate level. In addition, an independent research project is required, and students must satisfy the upper-level writing requirement.

### Foundational Course Requirement

The following foundational courses must be completed before acceptance into the concentration:

- MTH 171Q. Honors Calculus I
- MTH 172Q. Honors Calculus II
- MTH 173Q. Honors Calculus III
- MTH 174Q. Honors Calculus IV

Alternatively, students may satisfy the foundational course requirement by completing MTH 161, 162, 164, 165, and 235. Equivalent courses may be substituted for the above. Credit granted for AP courses may be used to satisfy foundational requirements.

### Core Course Requirement

Students must complete the following three courses:

- MTH 235H. Introduction to Algebra I (Honors)
- MTH 240H. Introduction to Topology (Honors)
- MTH 265H. Functions of a Real Variable I (Honors)

### Advanced Course Requirement

In addition to the core courses, students must complete four advanced mathematics courses, at least two of which are at the graduate level. Any mathematics course numbered 200 or above (except for courses used to satisfy the core course requirement) qualifies as an advanced mathematics course. Any mathematics course numbered 400 or above qualifies as a graduate-level course.

### Independent Research Project

Students work on an independent research project in either MTH 236H, 240H, 265H, or one of their graduate courses with the agreement and under the close supervision of the instructor of the course. Upon completion, students submit a written report on the project to the department Honors Committee and present a one-hour public talk at which the members of the committee are in attendance.

### Grade-Point Average Requirement

Students must complete the above program with at least a 3.25 grade-point average in order to qualify for the honors B.A. in mathematics.
235 should be taken early in the student’s concentration program.

- MTH 236. Introduction to Algebra I
- MTH 240. Introduction to Topology
- MTH 265. Functions of a Real Variable I
- MTH 282. Introduction to Complex Variables with Applications

Advanced Course Requirement
In addition to the core courses, students must complete six advanced courses as follows:
- Four advanced mathematics courses: Any mathematics course numbered 200 or above (except for courses used to satisfy the core course requirement) qualifies as an advanced mathematics course.
- Two additional advanced courses with substantial mathematical content: Courses that employ mathematical language, reasoning, or methodology qualify. Any mathematics course numbered 200 or above qualifies, as do certain nonintroductory courses in other departments. The most common courses in other departments that qualify are courses of a quantitative nature from the social and physical sciences, engineering, computer science or statistics, but there are other possibilities. Selections must be approved by the student’s departmental advisor.

THE B.S. IN APPLIED MATHEMATICS
A set of foundational courses must be completed before acceptance into the concentration. The concentration requires nine courses of which four are core courses and five are advanced courses. In addition, students must satisfy the upper-level writing requirement.

Foundational Course Requirement
The following foundational courses must be completed before acceptance into the concentration:
- MTH 161. Calculus I
- MTH 162. Calculus II
- MTH 164. Multidimensional Calculus
- MTH 165. Linear Algebra with Differential Equations
- PHY 121. Mechanics
- PHY 122. Electricity and Magnetism

Equivalent courses may be substituted for the above. For example, any of the mathematics honors courses MTH 171, 172, and 174 may be substituted for the equivalent MTH 161, 162, and 164 courses, and MTH 173 may be substituted for MTH 165. The sequence MTH 141–143 may be substituted for the sequence MTH 161–162. Credit granted for AP courses may be used to satisfy foundational requirements.

Core Course Requirement
Students must complete the following four courses. An honors version of a course can always be substituted for the listed course.
- MTH 235. Linear Algebra

The requirement that MTH 235 be taken can also be satisfied by completing MTH 173. MTH 235 should be taken early in the student’s concentration program.

- MTH 201. Introduction to Probability
- MTH 265. Functions of a Real Variable I
- MTH 282. Introduction to Complex Variables with Applications

Advanced Course Requirement
In addition to the core courses, students must complete five advanced courses as follows:
- Three advanced mathematics courses: Any mathematics course numbered 200 or above (except for courses used to satisfy the core course requirement) qualifies as an advanced mathematics course.
- Two additional advanced courses with substantial mathematical content: Courses that employ mathematical language, reasoning, or methodology qualify. Any mathematics course numbered 200 or above qualifies, as do certain nonintroductory courses in other departments. The most common courses in other departments that qualify are courses of a quantitative nature from the social and physical sciences, engineering, computer science or statistics, but there are other possibilities. Selections must be approved by the student’s departmental advisor.

JOINT CONCENTRATION IN MATHEMATICS AND STATISTICS
The details for this program are given under the listings for the statistics program.

THE MINOR IN MATHEMATICS
A set of foundational courses must be completed before acceptance into the minor. The minor requires one core course and two advanced courses.

Foundational Course Requirement
The following foundational courses must be completed before acceptance into the concentration:
- MTH 161. Calculus I
- MTH 162. Calculus II
- MTH 165. Linear Algebra with Differential Equation
- MTH 150. Discrete Mathematics or
- MTH 164. Multidimensional Calculus

Equivalent courses may be substituted for the above. For example, any of the mathematics honors courses MTH 171, 172, and 174 may be substituted for the equivalent MTH 161, 162, and 164 courses, and MTH 173 may be substituted for MTH 165. The sequence MTH 141–143 may be substituted for the sequence MTH 161–162. Credit granted for AP courses may be used to satisfy foundational requirements.

Core Course Requirement
Students must satisfy the following core course:
- MTH 235. Linear Algebra

The requirement that MTH 235 be taken can also be satisfied by completing MTH 173. MTH 235 should be taken early in the student’s minor program.

Advanced Course Requirement
In addition to the core course, students must complete two advanced mathematics courses. Any mathematics course numbered 200 or above (except for MTH 235) qualifies as an advanced mathematics course.

CERTIFICATE IN MATHEMATICAL MODELING IN POLITICAL SCIENCE AND ECONOMICS
The details for this certificate are given under the heading for Mathematical Modeling in Political Science and Economics.

MATHMATICS AND COMPUTER SCIENCE
Students interested in both mathematics and computer science are encouraged to pursue either a double concentration in mathematics and computer science, or a minor in mathematics and a concentration in computer science.

UPPER-LEVEL WRITING REQUIREMENT
The Department of Mathematics believes that the acquisition of the ability to write coherently on a mathematical topic, in a way that is acceptable to the general mathematical community, is an essential part of a successful major in mathematics.

To satisfy the mathematics department upper-level writing requirement, any student obtaining a degree in mathematics must pass two courses, which may be any of the following types: (1) an upper-level, four-credit mathematics course carrying a W designation, including MTH 300W, 302W, or 391W; (2) a one-credit course taken in conjunction with any 200-level mathematics course or MTH 174, with the prior approval of the instructor; (3) a two-credit course approved in advance by the student’s advisor in the mathematics department, satisfying the upper-level writing requirement in another department.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.


140A–141A. Calculus with Foundations. A two-semester sequence integrating the learning of calculus with precalculus mathematics. Intended for students who lack the algebra and trigonometry skills necessary to perform successfully in MTH 141.
The two-course sequence covers all the material in MTH 141 together with a thorough presentation of the standard precalculus material. When taken alone, MTH 140A covers, in addition to precalculus material, the theory and techniques of the differential calculus, but no material from the integral calculus. MTH 140A (Fall) and MTH 141A (Spring).

141—145. Calculus I—III. A three-semester sequence identical in content to the two-semester sequence MTH 161, 162 described below. (Fall and Spring)

150. Discrete Mathematics. Logic, functions, algorithms, mathematical reasoning, mathematical induction, recurrence relations, techniques of counting, equivalence relations, graphs, trees, as well as specific questions given by the “Towers of Hanoi,” and Euler’s “7 bridges of Königsberg problem.” Required for computer science majors.

161. Calculus I. Analysis of the elementary real functions: algebraic, trigonometric, exponentials and their inverses and composites; their graphs, derivatives, and integrals. Mean value theorem, maxima and minima, curve plotting. The fundamental theorem of calculus, with geometric and physical applications. (Fall and Spring)

161Q. Quest Calculus I. This is the first semester of the Quest version of MTH 161—162, which places emphasis on understanding concepts as well as on learning techniques. Students contemplating majoring in mathematics as well as others desiring a strong foundation in calculus are encouraged to take this course or the honors sequence.

162. Calculus II. Techniques of integration. Improper integrals, l'Hôpital’s rules. Infinite series, Taylor’s series in one variable. Plane curves, parametric equations, vectors in two and three dimensions, lines and planes, vector-valued functions, velocity and acceleration, arc length, curvature. Prerequisite: MTH 161 or equivalent. (Fall and Spring)

NOTE: Either MTH 164, 163, or 165 can be taken after MTH 162 or 143. The usual procedure would be to take MTH 164 followed by 165 or 163, but see Course Information on page 80.

162Q. Quest Calculus II. This is the second semester of the Quest version of MTH 161–162, which places emphasis on understanding concepts as well as on learning techniques. Homework includes more challenging and occasionally more theoretical problems. (Fall)

163. Ordinary Differential Equations I. Elementary methods, linear equations, and systems with constant coefficients, solutions in series, special functions, phase plane analysis and stability, Laplace transform, extremal problems. Prerequisite: MTH 143, 162, or 172. Equivalent to ME 164. (Fall and Spring)

164. Multidimensional Calculus. Differentiation and linear approximation, extrema, Taylor series. Line, surface, and volume integrals; coordinate changes, Jacobians. Divergence theorem, Stokes’ theorem. Determinants and matrices in N-dimensional vector spaces. Prerequisite: MTH 143, 162, or 172. Equivalent to ME 164. (Fall and Spring)

165. Linear Algebra with Differential Equations. Matrices, vector spaces and linear transformations, eigenvalues and eigenvectors, first-order differential equations, constant coefficient linear equations, systems of equations, applications to science, engineering, and computer science. Prerequisite: MTH 143, 162, or 172. (Fall and Spring)

171–174Q. Honors Calculus I—IV. Credit—5 hours for each course in this sequence. An honors sequence covering the material of MTH 161–164 in greater depth from the standpoint of both theory and applications. Students completing this sequence successfully will have met the requirements of MTH 235 and can begin taking upper-level courses immediately.

200. Transition to Advanced Mathematics. Introduces some of the basic techniques and methods of proof used in mathematics and computer science. Methods of logical reasoning, mathematical induction, relations, functions, and more. The course concludes with an application of the techniques learned to either group theory or real analysis. Prerequisite: MTH 163, 164, or 165. (Spring)

201. Introduction to Probability. Probability spaces; combinatorial problems; random variables and expectations; discrete and continuous distributions; generating functions; independence and dependence; binomial, normal, and Poisson laws; laws of large numbers. Prerequisite: MTH 162 or equivalent; MTH 164 recommended. Same as STT 201. (Fall)


203. Introduction to Mathematical Statistics. Principles of statistical decision theory; point and interval estimation, tests of hypotheses, multivariate normal distribution, linear hypotheses, selected topics. Prerequisite: MTH 201. Same as STT 203. (Spring)

208. Operations Research. Linear and nonlinear programming, sensitivity analysis, shipping and assignment problems, game theory, genetic algorithms, flow problems. (Fall)

210. Introduction to Financial Mathematics. An introduction to some of the mathematical concepts and techniques underlying finance theory. The main financial applications are to arbitrage pricing theory and option pricing. Prerequisite: MTH 201.

215. Chaos, Fractals, and Computer Graphics. The course surveys fractal geometry with applications to chaos theory and related computer software. Prerequisite: MTH 141, 161, or 171 or permission of instructor.

216. Mathematical Logic I. Propositional calculus, functional calculus of first and higher order, the decision problem, consistency, completeness. Same as PHL 216.


218. Introduction to Mathematical Models in Social and Life Sciences A. Both MTH 218 and 219 are aimed at building problem-solving ability in students through the development of mathematical models for certain real-life situations in the social and biological sciences. MTH 218 concentrates on axiomatic models and those involving autonomous systems of differential equations. Topics are selected from biology and political science, including voting theory and Arrow’s Theorem. Independent of MTH 219. Prerequisite: MTH 161.

219. Introduction to Mathematical Models in Social and Life Sciences B. Both MTH 218 and MTH 219 are aimed at building problem-solving ability in students through the development of mathematical models for certain real-life situations in the social and biological sciences. MTH 219 concentrates on probabilistic models and includes all necessary elementary probability theory. Linear programming and utility theory are also discussed. Topics are mostly selected from biology and economics. Independent of MTH 218. Prerequisite: MTH 162.


230. Number Theory with Applications. Divisibility, primes, congruences, quadratic residues and quadratic reciprocity, and primitive roots, with applications to cryptography and computer science.

235. Linear Algebra. Finite-dimensional vector spaces over R and C axiomatically and with coordinate calculations. Forms, linear transformations, matrices, eigenspaces. Prerequisite: MTH 164 or 165. (Fall and Spring)

236. Introduction to Algebra I. An introduction to basic algebraic structures, groups, rings, fields, with applications to specific examples. Prerequisite: MTH 235. (Spring)

236H. Introduction to Algebra I (Honors). An honors version of MTH 236.

237. Introduction to Algebra II. Continuation of MTH 236 covering field theory and Galois theory including proofs of the impossibility of “trisecting angles,” “doubling the cube,” “squaring the circle,” and “solving 5th-degree polynomials.”

238. Combinatorial Mathematics. Permutations and combinations; enumeration through recursions and generating functions; Polya’s theory of counting; finite geometries and block designs; counting in graphs.

240H. Introduction to Topology (Honors). An honors version of MTH 240.

247. Theory of Sets. Sets, relations, mappings, equivalence, order, cardinals, ordinals, transfinite arithmetic; axiom of choice and equivalents.


250. Introduction to Geometry. Foundations of geometry, isometry, similarity, invariance, introduction to affine, projective, and various non-Euclidean geometries.

255. Differential Geometry I. Torsion, curvature, the differential geometry of curves and surfaces in 3-space. Prerequisite: MTH 164 or 174.

256. Differential Geometry II. Riemannian geometry. Prerequisite: MTH 255.

263. Ordinary Differential Equations II. A second course in ordinary differential equations in the real domain. Prerequisite: MTH 163 or equivalent and MTH 235, or consent of the instructor.

265. Functions of a Real Variable I. Real number system, uniform continuity, mean value theorems, bounded variation, Riemann-Stieljes integral, sequences of functions. Prerequisites: MTH 163 and 164, or 174, or equivalent. (Fall)

265H. Functions of a Real Variable I (Honors). An honors version of MTH 265.

266. Topics in Real Analysis. A continuation of MTH 265/265H. Possible topics: a rigorous exposition of Fourier analysis; multivariable analysis; elementary theory of Hilbert and Banach spaces. Prerequisite: MTH 265/265H or equivalent.

280. Introduction to Numerical Analysis. The numerical solution to mathematical problems by computer. Linear systems, approximation, integration, and differential equations. Floating point arithmetic and consequent pitfalls of computation. Prerequisite: MTH 162 or equivalent. Same as STS 280.

281. Introduction to Fourier Series, Orthogonal Polynomials, and Boundary Value Problems. Fourier series and convergence theorems. Orthogonal polynomials. Applications to some partial differential equations. Fourier transforms. Prerequisites: MTH 163 and 164 or 174. Equivalent to ME 201. (Fall)

282. Introduction to Complex Variables with Applications. Complex differentiation and integration, analytic functions, singularities, residues, poles, series, expansions, conformal mapping, with some applications. This course is independent of MTH 281. Prerequisite: MTH 164 or 174. Equivalent to ME 202. (Spring)


290. Mathematical Biology. Introduces students to some standard mathematical methods/models in biology, including ordinary/partial differential equations, dynamical systems, and Stochastic processes. Applications to various topics in biology such as population biology, genetics, ecology, models of evolution, and DNA sequencing are pursued. Prerequisite: MTH 162 or equivalent.

300W. History of Mathematics. The nature and style of mathematics in ancient Babylonia, Egypt, and Greece; medieval and Renaissance Europe; seventeenth-century Europe; and some aspects of the development of abstraction and rigor in analysis and set theory since 1700. Some of the actual methods and problems of the eras studied are part of the material of the course. (Spring)

302W. History of Mathematics II. The style and development of European mathematics from roughly 1650 to roughly 1950. The development of calculus and analysis, algebra, probability, geometry (including non-Euclidean geometry), set theory, are all touched on. The introduction of the idea of rigorous proof. This course is independent of MTH 300W and may be taken independently of it.

391. Independent Study in Mathematics. Special work arranged individually.

The following graduate courses are open to advanced undergraduates with permission of the instructor.

436. Algebra I. Rings and modules, group theory. Galois theory. Prerequisite: MTH 237. (Fall)

437. Algebra II. Multilinear algebra, quadratic forms, simple and semi-simple rings and modules. Prerequisite: MTH 436. (Spring)

440. General Topology I. Continuity, compactness, connectedness, metrizability. Product spaces. Prerequisite: MTH 265. (Fall)

443. Algebraic Topology I. The combinatorial structure of complexes and the homology of polyhedra. Applications of algebraic techniques in topology to classification of surfaces, fixed point theory, and analysis. Prerequisites: MTH 436 and 440. (Spring)

457. Theory of Analytic Functions I. Cauchy theorems, Taylor and Laurent series, residues, conformal mapping, analytic continuation, product theorems. Prerequisite: MTH 265 or equivalent. (Fall)


A more detailed description of other graduate-level courses may be found in the Official Bulletin: Graduate Studies.

MODERN LANGUAGES AND CULTURES

Thomas DiPiero, Ph.D. (Cornell) Professor of French and of Visual and Cultural Studies
Susan Gustafson, Ph.D. (Stanford) Karl F. and Bertha A. Fuchs Professor of German Studies and Professor of German
Kathleen Parthé, Ph.D. (Cornell) Professor of Russian; Director of Russian Studies
David Pollack, Ph.D. (California, Berkeley) Professor of Japanese
Claudia Schaefer, Ph.D. (Washington University, St. Louis) Professor of Spanish
Sharon Willis, Ph.D. (Cornell) Professor of French and of Visual and Cultural Studies
Joanne Bernardi, Ph.D. (Columbia) Associate Professor of Japanese
John Givens, Ph.D. (Washington) Associate Professor of Russian
Beth Jörgensen, Ph.D. (Wisconsin) Associate Professor of Spanish
Cilas Kemedjio, Ph.D. (Ohio State) Associate Professor of French
Raul Rodriguez-Hernandez, Ph.D. (Cornell) Associate Professor of Spanish
Donatella Stocchi-Perucchio, Ph.D. (Cornell) Associate Professor of Italian
Jennifer Creech, Ph.D. (Minnesota) Assistant Professor of German
Ryan Prendergast, Ph.D. (Emory) Assistant Professor of Spanish
Friederike Seligman, Ph.D. (Michigan) Assistant Professor of Russian
June Hwang, M.A. (California, Berkeley) Instructor in German
Andree R. Douchin, Ph.D. (Rochester) Senior Lecturer in French
Laura Givens, M.A. (Washington) Senior Lecturer in Russian
Berthe Kouroublakis, M.A. (NYU) Senior Lecturer in Spanish
Alexandra Kuzmich, M.A. (University of Kansas) Senior Lecturer in German
Anne D. Lutkus, Ph.D. (Indiana) Senior Lecturer in French; Language Coordinator
Anna Maskennikova, Ph.D. (St. Petersburg) Senior Lecturer in Russian
Luisa O’Keefe, M.A. (SUNY, Buffalo) Senior Lecturer in Italian
Fumino Shino, R.N. (Kumamoto University) Senior Lecturer in Japanese
Maniko Tamate, M.B.A. (Temple University) Senior Lecturer in Japanese
Shifang Yu, B.A. (Fujian University) Senior Lecturer in Chinese
Anamaria Cole, M.A. (George Mason University)
Lecturer in Spanish

Philip R. Berk, Ph.D. (Pittsburgh)  Professor Emeritus of French Literature

Wilhelm Braun, Ph.D. (Toronto)  Professor Emeritus of German Literature

Patricia Herrington, Ph.D. (Washington University)  Karl F. and Bertha A. Fuchs Professor Emerita of German Studies

Robert ter Horst, Ph.D. (Johns Hopkins)  Professor Emeritus of Spanish

A supplementary staff of part-time faculty, foreign exchange students, and teaching assistants is assigned to aid in the instruction of language. Please consult the MLC Web site for details: www.rochester.edu/College/MLC/.

The Department of Modern Languages and Cultures offers programs of study in many of the major modern foreign languages, cultures, and literatures (leading to the B.A. degree). The M.A. is awarded in comparative literature, French, German, and Spanish. Students interested in teaching should consult the Warner School for information on the M.A.T.

LANGUAGE INSTRUCTION
Language instruction is offered in seven modern languages: Chinese, French, German, Italian, Japanese, Russian, and Spanish. Students wishing to enter a language sequence should consult with a departmental advisor for proper placement, which is based on the student’s previous training as determined by scores on standard placement tests and the departmental placement questionnaire. Departmental advisors are available during freshman orientation and preregistration periods as well as throughout the academic year.

Students with previous language study who wish to enter advanced language or literature courses should consult with advisors in their field of interest. Students interested in course credit for advanced placement should see the undergraduate advisor in the particular language. For nonconcentrators, foreign language skills provide an extra edge in applying for graduate study or for employment that requires travel or work in the international community.

Programs such as the Certificate in Management Studies and the International Relations Certificate in combination with a language concentration offer students wider career horizons.

ADVANCED COURSES OF STUDY
Students with advanced knowledge of a language (i.e., with five or more semesters of college study completed) can choose courses from three broad areas. Literature courses permit the student to analyze critically the aesthetic, philosophical, and political complexities of a society’s literary traditions. Culture courses examine both literary and nonliterary texts of all kinds, from essay to film to fashion to comics. Advanced language courses provide further study of language itself its production, history, and structure.

The department-wide program in comparative literature studies literary and cultural texts from perspectives which cross traditional boundaries and national frontiers. International by definition, comparative literature systematically and thoughtfully questions linguistic and cultural limits. It examines literature and other texts in relation to their historical context and establishes a dialog among art forms. Courses in comparative literature, all of which are taught in English, encourage the participation of students from all disciplines and emphasize the formation of critical attitudes and interpretive skills. Popular culture, globalization, media and technology, consuming texts, and issues of race, class, and gender all pertain to this program of study.

CLUSTERS IN MODERN LANGUAGES AND CULTURES
Modern languages and cultures offers multiple options for humanities clusters, many of which can easily be turned into a minor by adding two more courses.

If you would like to: (1) start a new language or culture area; (2) continue with a language you began in high school; or, (3) do more advanced work in a language you know fairly well, then there is a choice of clusters for you in every language section, as well as in comparative literature and Russian studies (which offers several humanities clusters and one in the social sciences).

Consult the Department of Modern Languages and Cultures homepage as well as the cluster search engine for the most up-to-date information on cluster choices, and if you have any questions, get in touch with the department and you will be directed to the appropriate undergraduate advisor for the area in which you are interested.

STUDY ABROAD OPPORTUNITIES
The department actively encourages students to plan a minimum of one semester of foreign study. Work completed in an approved study abroad program may be given concentration credit up to a maximum of four courses in French, German, Italian, Japanese, Russian, and Spanish. Students interested in studying abroad should consult with their departmental advisor and seek the assistance of the College Center for Study Abroad and Interdepartmental Programs located in Lattimore Hall.

Semester and Academic Year Programs
The University is affiliated with the Institute of European Studies, which offers semester and academic year programs in France (Paris, Nantes), Japan (Tokyo and Nagoya), Spain (Madrid, Salamanca, and Granada), and Argentina (La Plata), as well as with the Council on International Education Exchange programs in Russia (St. Petersburg), the People’s Republic of China (Beijing, Nanjing, and Fudan), the Dominican Republic, and Chile. Qualified students may also participate in internship programs in the German Bundestag, the French National Assembly, and the Russian Foreign Ministry, as well as in various political, business, medical, and performance internships in Bonn, Paris, and Madrid. The Skalny Center for Polish and Central European Studies provides students with an opportunity to develop an interdisciplinary knowledge of Polish and Central European politics, history, cultures, and international relations with Eastern (Russia/Soviet Union/Post-Soviet States) and Western Europe, as well as with the United States. An interdepartmental major or minor in Polish and Central European studies (PCES) may be designed through the Skalny Center and administered through the College Center for Study Abroad and Interdepartmental Programs. The Skalny Center itself offers a Certificate in Polish and Central European Studies.

Study on Location in Arezzo, Italy. Special Degree Program in Italian Studies. The University of Rochester currently offers a one-semester, interdisciplinary program in Italian studies in Arezzo, Italy. The program is directed on campus by Professor Stocchi-Peucchi (Italian) and an advisory committee, in collaboration with a University of Rochester-appointed director on location, Donna Logan. The program is directed by University of Rochester faculty on a rotating basis and administered through the College Center for Study Abroad and Interdepartmental Programs. The Arezzo program takes place in the fall, offers 16 credits, and may be taken as partial fulfillment of the requirements:

- for the minor in Italian
- for an individualized interdepartmental concentration in Italian studies

Students interested in option B may create an interdepartmental concentration through the College Center for Study Abroad and Interdepartmental Programs.

Upperclass students are eligible to compete for exchange fellowships with the University of Cologne (Germany) and the University of Haute-Bretagne (Rennes, France); the awards cover full tuition and living expenses for one academic year.

Summer Programs
Modern languages and cultures sponsors special intensive language programs abroad during the summer for students of French in Rennes, France; for students of German in Berlin, Germany; for students of Italian in Padua, Italy; for students of Spanish in Oaxaca, Mexico; and for students of Russian in St. Petersburg, Russia. Some programs require the completion of one semester of foreign language studies at the University (consult with program).

Through the bequest of Mildred R. Burton, travel fellowships and summer study grants are available in annual competitions administered by the department.
CONCENTRATION PROGRAMS

The department offers the B.A. degree in comparative literature, French, German, Japanese, Russian, and Spanish; it offers minors in comparative literature, French, German, Italian, Japanese, Russian, Spanish, and Latin American studies. For specific courses offered in each of these subject areas, please consult the undergraduate advisor for the section and the MLC Web site. Courses in Polish are also offered through MLC as part of the certificate program in Polish and Central European studies. (Instruction in Arabic, Classical Greek, Latin, and Hebrew is offered in the Department of Religion and Classics.)

Concentration programs are balanced between advanced language preparation and literary and cultural studies. In many upper-level courses, the reading and most of the writing and coursework are in the original language. Concentrators are strongly urged to strengthen their background for literary studies by taking related courses in English literature, film, fine arts, history, music, philosophy, religion and classics, visual studies, and women's studies.

REQUIREMENTS AND RECOMMENDATIONS FOR MAJOR CONCENTRATIONS

All MLC majors follow a common model outlined below. Within each section specific course requirements vary.

Eleven courses are required for a major.

1. Five to seven area core courses (from the national language or comparative literature section); the language area core begins with 151–152. Students who place out of 151–152 take the equivalent number of additional electives, to be chosen in consultation with their advisor.

2. Two to four area electives, decided upon in consultation with the undergraduate advisor for the section. Students who place out of 151–152 may take up to two courses in allied fields outside of the department.

3. Two department-wide requirements (MLC core):
   a. CLT 101 or another approved CLT course introducing the study of language, literature, and culture
   b. CLT 389 (Major Seminar) (393 Senior Essay can be petitioned in extraordinary circumstances)

MLC Core

MLC 1: Introduction to Language, Literature, and Culture.

A primary examination of the concepts of culture, language, and literature which are at the foundation of the MLC program. This requirement may be fulfilled by any section of CLT 101, or by another CLT course chosen in consultation with the student’s undergraduate advisor. This component should be taken by the fall of the junior year and may be taken concurrently with courses in the major.

MLC 2: Major Seminar. A department-wide seminar introducing students to the fundamental texts of national and comparative literary and cultural theory. Successful completion of the MLC Seminar qualifies students for consideration for admission to the honors program. Students are strongly urged to enroll in the MLC Seminar in their junior year. The MLC Major Seminar is offered every semester.

French

1. Concentrators are required to take the following courses:
   a. Three core courses: FR 200, 202, 204
   b. The elective core: six additional courses above the 114 level in French. In order to achieve a historical balance to the concentration, students must complete at least one pre-1900 course.
   c. The MLC core

2. Concentrators are expected to consult with the French undergraduate advisor before registering for courses.

3. Concentrators are urged to consider studying in a French-speaking country for a year, a semester, or a summer. The University is affiliated with the IES program at Paris and Nantes, the Educational Programs Abroad internship in the French National Assembly, and the Paris Film Program. Work done in an approved study abroad program may be given concentration credit up to a maximum of four courses. Students are especially encouraged to participate in the department’s six-week summer program in Rennes, France.

4. Concentrators intending to teach French at the secondary level or to do graduate work in French are advised to acquire a reasonable facility in another foreign language.

German

1. Concentrators are required to take the following courses:
   a. Four core courses: GER 200, 202, 203, 204, 205, or 206
   b. The elective core: five additional courses above the 206 level in German. In order to achieve a reasonable balance to the concentration, students are encouraged to complete at least one course focusing on the period before 1848, and another on the period 1848–1933. With the approval of the undergraduate advisor up to two electives may be fulfilled by advanced-level courses taken in another department or by GER 151 and/or GER 152.
   c. The MLC core

2. Concentrators are expected to consult with the German undergraduate advisor before registering for courses.

3. Concentrators are urged to consider studying in a German-speaking country for a year, a semester, or during the summer. The University is affiliated with the IES programs in Freiburg, Vienna, and Berlin, the Educational Programs Abroad internship programs in Bonn and Cologne, and the Berlin Summer Program. The German section also has a unique exchange program with the University of Cologne. Work completed in an approved study abroad program may be given concentration credit up to a maximum of four courses in German.

Japanese

1. Language emphasis: eight consecutive courses in Japanese language; three additional courses from at least two different groups: culture, film, literature; and CLT 389 (MLC Major Seminar).

2. Culture emphasis: six consecutive courses in Japanese language; five additional courses from at least two different groups (culture, film, literature); and CLT 389 (MLC Major Seminar) or Senior Thesis (by application only).

3. CLT 389 (MLC Major Seminar)/JPN 393 (Senior Honors Thesis). JPN 393 may be substituted for by permission only. JPN 393 is a two-semester course requiring extensive bibliographical preparation and research leading to a substantial research paper.

A study abroad program in Japan typically entails third-year Japanese and three or four Japan-related courses in English.

Work completed in an approved study abroad program may be given concentration credit up to a maximum of four courses in Japanese. Credit for study abroad must be arranged in advance with the major advisor.

Russian

1. Concentrators are required to take the following courses:
   a. Core courses: at least two language courses at the 200 level (for example, 202, 209) and two courses in Russian literature, one of which is based in the nineteenth century, and the other in the twentieth century.
   b. Electives: students who choose to count 151–152 towards the major should choose at least three additional courses in Russian language, literature, or culture. Others choose five electives in Russian/Russian studies.
   c. The MLC core

2. Students are strongly encouraged to work on their language skills throughout their program, both with courses at the University of Rochester (for example, 114, 204, 209) and, if possible, on our summer program in St. Petersburg (for which they receive up to 6 credits towards concentration requirements), or a semester-long program in Russia.

An interdisciplinary concentration in Russian studies is also available. See the separate entry in this bulletin, page 126.

Spanish

1. Concentrators are required to take the following courses:
   a. Three core courses: SP 200 or 201; 203, and 202 or 204
   b. The elective core: six additional courses above the 200 level in Spanish. In order to achieve a reasonable balance to the concentration, students are encouraged to include
at least one of the two culture courses, SP 205 or 206. With the approval of the undergrad-uate advisor up to two electives may be ful-filled by advanced-level courses taken in another department or by SP 151 and 152 taken at the University of Rochester.

c. The MLC core

2. Concentrators are expected to consult with the Spanish undergraduate advisor before register-ing for courses.

3. Concentrators are urged to consider studying in a Spanish-speaking country for a year, a semester, or during the summer. The University is affiliated with the IES in Madrid, Barcelona, Granada, and Salamanca and the Council on International Education Exchange with programs in Chile, the Dominican Repub-lic, Argentina, and Brazil. Work completed in an approved study abroad program may be given concentration credit up to a maximum of four courses in Spanish.

4. Students intending either to teach Span-ish on the secondary level or to undertake graduate work are advised to acquire, at the minimum, reading proficiency in at least one foreign language.

Comparative Literature

The major in comparative literature provides students with work in a wide range of liter-ature, culture, and theoretical approaches to subjects such as popular culture, film, global media, and cross-cultural influences. This major is designed especially for students with interests in interdisciplinary approaches to literature and culture. The major in comparative literature consists of a minimum of 11 courses as follows:

1. Concentrators are required to take the fol-lowing courses:

   a. At least five courses in one area of lit-erature and/or culture.

   b. Four courses either in a second area of literature and/or culture or four courses that emphasize theory in comparative litera-ture or in related programs and depart-ments (such as English, art history, film and media studies, philosophy, music), chosen in consultation with the advisor.

   c. The MLC core

2. Concentrators are expected to consult with the comparative literature undergraduate advisor before registering for courses. Work completed in an approved study abroad program may be assigned concentration credit.

REQUIREMENTS AND RECOMMENDATIONS FOR MINORS

Five courses are required for the minor, which begins at the 151 level or above (101 for CLT).

Minor in Comparative Literature

The minor in comparative literature provides students with work in a wide range of theoret-ical issues as they relate to literature and cul-ture within interdisciplinary contexts. Students take five courses in comparative literature and theory; some may be selected from other pro-grams (e.g., English, art history, film and media studies), in consultation with the advisor. Con-centrators in a modern language may use some of their major courses toward a minor in comparative literature.

Minors in Modern Languages

Language minors give students sufficient facility in the use of a foreign language to read sources in the major field with ease, to con-verse with some facility, and to have knowl-edge of other lands, their history, their institu-tions, and their artistic achievements. The minor is not thought of as giving students a total picture of a field that is too large even for an undergraduate major. Rather, it is to give students a coherent set of courses from which they can branch out into the more thorough study of their given field.

Students minoring in languages are urged to study abroad for a year, a semester, or during the summer. The University is affiliated with the IES programs in Freiburg, Nantes, Paris, Tokyo, Nagoya, Madrid, and Mexico City as well as with the Council on International Edu-ca-tion Exchange programs in St. Petersburg, Beijing, Nanjing, and Fudan. Students are also encouraged to investigate internships available through Educational Programs Abroad in Bonn, Paris, and Madrid. Up to two advanced courses in an approved study abroad program may be approved for credit toward the minor.

Minor in Chinese

The minor in Chinese requires 6 courses beginning with CHI 101. Students may combine language, literature, and culture courses selected from the offerings of the Chinese section.

Minor in French

The minor in French requires five courses beginning at FR 151. These normally include FR 151–152 (Intermediate French), FR 200 (Advanced French), FR 202 (Introduction to French Literature), FR 204 (Contemporary France), and FR 206 (French Cultural Traditions). With permission of the undergraduate advisor, another 200-level course may be substi-tuted for one of the above. Students may fulfill requirements for the minor through Study Abroad.

Minor in German

The minor in German requires five courses beginning at GER 151. These normally include GER 151–152 (Intermediate German), GER 200 (Advanced German), GER 202 (Contemporary German Issues), GER 203 (Introduction to German Literature), and GER 205 (Nietzsche) or GER 206 (Freud). Study abroad may par-tially satisfy the requirements for the minor and is highly recommended.

Minor in Italian

The minor in Italian requires an intermediate level of competence in the language. Typically this can be achieved with the successful com-pletion of IT 151. In addition, the minor requires four upper-level courses in Italian. IT 157/207 (Italian in Italy) and a maximum of two courses taken abroad within non–University of Roch-es ter programs may be taken as partial fulfill-ment of the requirements for the minor in Italian. Students are encouraged to participate in the University of Rochester semester study on location in Arezzo, Italy. All credits at the level of IT 151 or above earned in the Arezzo Program can apply to the minor in Italian.

Minor in Japanese

The minor in Japanese requires five courses beginning with JPN 101. Students may combine language, literature, and culture courses selected from the offerings of the Japanese section.

Minor in Russian

The minor in Russian requires five courses beginning at RUS 151. Students may combine language and literature courses selected from the offerings of the Russian section of MLC.

An interdisciplinary minor in Russian stud-ies is also available. See the separate entry in this bulletin, page 130.

Minor in Spanish

The minor in Spanish requires five courses beginning at SP 151. These normally include SP 151–152 (Intermediate Spanish), SP 200 (Advanced Spanish), or SP 201 (Spanish for Native Speakers). Study abroad may satisfy some requirements of the minor and is recom-mended.

Minor in Latin American Studies

The minor in Latin American studies can serve to complement the student’s major field of concentration by giving him or her a broad view of Latin American cultures and their relations to the United States and the rest of the world.

Five courses with Latin American content are required for the minor, of which three must be at the 200-level from the Department of Modern Languages and Cultures, and two from related areas such as history, political science, and anthropology. The minor must be approved by the Spanish section in its beginning stages.

Normal offerings in the Department of Mod-ern Languages and Cultures include:

• SP 204. Spanish-American Literature: 1800 to Present
• SP 206. Spanish-American Cultures
• SP 255. Twentieth-Century Spanish-American Theater
• SP 256. Contemporary Spanish-American Prese
• SP 257. Modern Spanish-American Poetry
• SP 259. Third World Women and Global-ization
• SP 261. Facing Facts: Spanish-American Nonfiction
• SP 262. Topics in Spanish-American Litera-ture
• HIS 203. Economies and Societies of Latin America

In history
• HIS 203. Economies and Societies of Latin America

In anthropology
• ANT 230. Culture, Class, Race in Latin America

In political science
• PSC 268. Transitions to Democracy

In religion and classics
• REL 234. Cry Freedom: Liberation Theologies

Other courses with approval of the Spanish undergraduate advisor.

STUDENT TEACHING
Concentrators interested in student teaching experience for the purpose of New York State certification should consult with the Margaret Warner Graduate School of Education and Human Development as well as with their advisor.

UPPER-LEVEL WRITING REQUIREMENT
The upper-level writing component of concentrators’ programs in MLC focuses on both general (conceptual and theoretical) and specific (national) experiences of research, argumentation, composition, and editing and is satisfied by taking the two departmental core courses (CLT 101 and CLT 389) required of all majors.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

COMPARATIVE LITERATURE
(Many courses in comparative literature are cross-listed from courses in national language areas, and all are taught in English.)

101. Topics in Comparative Literature
An introduction to the study of literature and culture in a comparative and theoretical context. Close critical scrutiny of cultural difference as manifested in a variety of literary texts and cultural phenomena. Topics vary and include Great Books, Great Debates; Pornography, Censorship, and Speech; Bodies of Evidence; Culture/Clash; 1968; Popular Culture; Historical and Imaginary Paris; Barcelona and the Cultures of the Mediterranean.

114Q. Great Cities: The Shogun’s Capital: Edo 1600–1850. Edo (modern Tokyo) began around 1600 as the shogun’s administrative center for all Japan. For centuries only a tiny fishing port, Edo quickly became a bustling and picturesque urban center, and by 1750 was the largest city in the world. This course examines Edo as historical, political, urban, social, religious, and artistic artifact, exploring the various forces contributing to the creation and shaping of the city, to discover how people lived in and understood this novel environment. The course is taught in English.

206A. The New Berlin. This interdisciplinary course examines the history and culture of the German capital through the lens of literature, film, architecture, politics, and cultural theory. Coursework focuses on Berlin as a center for new technological and economic developments, cultural experimentation, and the construction of national identity. The course focuses on recurring metaphors of change and renewal, asking how today’s “new” post-wall Berlin differs from the “new Berlins” of the past.

212A. Monsters, Ghosts, and Aliens. This course focuses on the horror genre as popular entertainment in Germany, England, and the United States in the nineteenth and twentieth centuries. Particular attention is paid to the construction of others as monsters (Frankenstein, vampires, devils, aliens, etc.). Authors include Shelley, Stoker, Rice, and King. Films include The Haunting, Alien, The Shining, and Silence of the Lambs. This course is part of the Horror in Literature and Film cluster.

214E. Japanese Animation (Anime). An exploration of Japanese popular culture through the world of anime. Films cover a wide range of subgenres, from Hayao Miyazaki’s The Castle of Cagliostro to more recent works including Akira (cyberpunk), Silent Mobius, and Neo-Tokyo (futuristic manga adaptations), Robot Carnival (battling robots, androids), Grave of the Fireflies (postwar nostalgia). Discussions address issues of landscape (city vs. “furusato”), period, fantasy, gender (male, female, androgynous), racism (self vs. other), cultural anxiety. Screenings are held in tandem with an anime series at the George Eastman House. Class taught in English with additional instruction in Japanese as required for majors.

215A. Russia Goes to the Movies. In Russia, the dawn of the age of movies coincided with the birth of the Soviet state. According to Lenin, the most revolutionary of the arts was also to be the art of the Revolution. Yet Soviet directors, from Eisenstein to Tarkovsky, were also among the world’s most influential filmmakers. This class looks at these artistically interesting and popular films while exploring the changing relationships between politics, experimentation, and entertainment in Russian cinema, always mindful of the backdrop of totalitarian society and the nature of mass culture in general. Topics include Innovation and Ideology: From Hollywood to High Stalinism; Popular Patriotism; The Thaw in Cinema after Stalin’s Death; From High Hopes to Stagnation (the sixties and seventies); The Last Days of Soviet Film and the New Russian Cinema. No knowledge of Russian required. Attendance at weekly screenings is mandatory.

216C. Women in Hispanic Film. Critics tend to divide the representation of women in Hispanic films into mutually exclusive, confrontational categories such as virgin or whore, maternal or seductive, traditional or modern, icon or fallen idol. This course examines images of women in a variety of films from Latin America and Spain to problematize these artificial divisions and to seek out the ambiguous and conflictual aspects of personal (and national) identity embodied in them. Topics range from the use of “the feminine” in war propaganda (Spain, Cuba, and Central America) to films of the Franco dictatorship, and from Latin American political documentaries to popular commercial films by directors such as Bunuel, Almodovar, Bemberg, Saura, Arau, Leduc, and Novaro. Emphasis is on cinematic representation as visual ideology and on films at the millennium. Class taught in English. Written work in Spanish for SP credit.

217B. Race and Gender in Popular Films. This course explores Hollywood’s current fascination with race and gender as social issues and as spectacles. In particular, the course focuses on the ways that social differences have become the sites of increasingly conflicted narrative and visual interactions in our films. To examine competing representations of racial difference and sexual difference in contemporary U.S. culture, popular films of the 1980s and 1990s, from thrillers to action films to comedies, are analyzed.

222A. Sexuality and Gender: Eighteenth-Century Representations. This course explores eighteenth-century conceptions/constructions of the body, sexuality, and gender as manifest in medical papers, handbooks, aesthetic essays, and literary works to include Lessing’s Laocoon, Herder’s Paganism, Moritz’s On Beauty, Schiller’s On the Education of Man, Rousseau’s Julie, Richardson’s Clarissa, Goethe’s Natural Daughter, and Schlözer’s Maria Stuart. Additional theoretical readings include: Foucault, Kristeva, Butler, and G.S. Rousseau.

231B. Madness and Postcolonial Literature. This course explores inscriptions of madness in postcolonial African and Caribbean texts. Beyond the obvious and visible signs of what is generally termed “madness” (from the pathological to the political or cultural), we ask ourselves if the postcolonial arena cannot be interpreted as a pervasive manifestation of madness, that is to say, of something fundamentally “alien,” “foreign” to the Known, to the imperial destructuring order, and to the disarticulated colonial and postindependent communities. By bringing together texts from different and diverse cultural and intellectual areas such as France, Guadeloupe, and Africa, we seek to confront the various “scriptures” of witch-hunt, of disintegration of Juletane, the Antillean women in West Africa, from Foucault’s normative panoplistic to Fanon’s discussion of the black experience, the postcolonial situation, articulated or silenced, will be the focus of this course. Taught in English. Reading list: Michel Foucault, Discipline and Punish; Edouard Glis-
sant, The Caribbean Discourse; Frantz Fanon, Black Skin, White Masks; Sony Labou Tansi, The Antipeople; Maryse Conde, I, Tituba, Black Witch of Salem; Myriam Warner-Vieyra, Juletante; Henri Lopes, The Laughing Cry.

236B. U.S. Latinos/Latinas. This course introduces students to the emergent field of U.S. Latino/Latina writing and culture. Does the rich diversity of Latino communities in the United States—stretching from Los Angeles and the southwest to Miami and New York via Texas, Chicago, Minneapolis, and all stops in between—frustrate or cancel any attempt to group their experiences under a single ethnic-racial term like “Latino/a”? What exactly is “the browning of the Midwest”? To what kind of gender, sexual, and racial codes are the inhabitants of these communities subjected? How do Latino/a narratives map the conflicted terrains of “utopias without borders,” free-trade zones, diasporas, nomadic workforces, and even the Internet? Latinos, Latin Americans, immigrants, exiles, refugees, border peoples, rafters—it is increasingly as difficult to define the legal status of individuals and communities as it is to talk about social, economic, and cultural identities. To be Latino in the United States is to participate in a unique process of cultural syncretism that some day may become a transformative template for the whole society. We examine two among the many provocative questions for the twenty-first century: (1) What will be the effects of further Latinization of the American urban landscape? and (2) What does “buscando America” mean for different cultural groups and social classes? Readings and discussions include Mike Davis, Magical Urbanism; Latinos Reinvent the U.S. City, Junot Diaz, Drown, Sandra Cisneros, and texts by Piri Thomas, Julia Alvarez, John Rechy, Ana Castillo (The Goddess of America), Richard Rodriguez (Days of Obligation), Rodolfo Acuna, Helena Maria Viramontes, Gustavo Perez Firmat, Ilan Stavans, and others. Class taught in English.

265E. Dangerous Texts: Literature and Politics in Russia. When modern Russian literature began to evolve in the mid-1600s, the printed or written text was immediately seen as a potential danger to the power of Church and State. This course examines dangerous texts from the seventeenth century to the present to see what aspects of texts and their authors were seen as threats and how these threats were dealt with. Also explored are the ways in which writers did indeed perceive themselves as a second government and how this changed the way they wrote. The reading list includes works by Avakum, Radishev, Pushkin, Lesmontov, Gogol, Turgenev, Dostoevsky, Tolstoy, Babel, Mayakovsky, Mandelstam, Pasternak, Yevtushenko, Solzhenitsyn, Voinovich, Grossman, and Sinyavsky/Tertz. The goal of this course is to arrive at an understanding of the unique role played by literature in Russian history. Class taught in English.

282B/482B. Nietzsche and the Nietzscheans. Friedrich Nietzsche continues to be one of the most influential modern philosophers, yet controversy surrounds almost every aspect of his life and work. This course helps students go beyond the controversy in order to consider Nietzsche’s texts discerningly and how he approached the problems of truth, power, and morality. Close examination of his most important writings are complemented by inquiry into Nietzsche’s effects on twentieth-century philosophy, literature, and visual culture. Other thinkers include Spengler, Weber, Heidegger, Foucault, Kofman, Derrida.

CHINESE

101. Elementary Chinese I. Credit—6 hours. Introduction to modern spoken Mandarin. Emphasis is on developing the students’ ability to speak and comprehend the most widely used dialect of modern Chinese.

102. Elementary Chinese II. Credit—6 hours. Continuation of CHI 101, and an introduction to elementary readings in Chinese.

151. Intermediate Chinese I. Continuation of spoken Mandarin and vernacular written materials. Prerequisite: CHI 102 or equivalent.

152. Intermediate Chinese II. Continuation of CHI 151.

201. Advanced Chinese I.

202. Advanced Chinese II.

210. Introduction to Traditional Chinese Culture. An overview of important developments in shaping four millennia of Chinese culture from early historical times to 1800, with emphasis on the basic elements of its religious, philosophical, literary, and artistic traditions.

232. Asian Calligraphy. East Asian calligraphy is the oldest continuous writing system in the world, and ranks as an art with poetry and painting. This innovative course joins the two components by offering a class period of writing with a licensed teacher of calligraphy, and one dealing with the history and art of calligraphy each week. Students must attend and are graded on both parts. The course is restricted to those who have completed at least one year of formal Chinese or Japanese language instruction. Enrollment is limited and preference is given to those currently enrolled in Asian language study.

FRENCH

101. Elementary French I. Fundamentals of the grammar, culture, and pronunciation of the language. Emphasis is on developing communication skills, principally speaking but including listening, reading, and writing. (Fall and Spring)

102. Elementary French II. Continues the work of the beginning course. There is an added emphasis on reading comprehension and vocabulary building. (Fall and Spring)

114. Conversational French. Credit—2 hours. Emphasis on speaking skills with focus on current issues in French culture and society. Prerequisite: FR 102 or equivalent. May be taken concurrently with FR 151 or 152. May be taken twice for credit. (Fall and Spring)

151. Intermediate French I. Intermediate-level study of French and French culture. Special emphasis on the geography of France and contemporary French culture and on development of reading, discussion, and composition skills. Prerequisite: FR 102 or equivalent. (Fall and Spring)

152. Intermediate French II. Continuation of FR 151 with emphasis on a historical approach to French culture. Continued attention given to reading, discussion, and compositional skills. (Fall and Spring)

155. French Conversation and Composition. The most advanced conversation and composition course aims to bring students to a level of proficiency with the spoken language, including its idiomatic forms, and to refine composition skills. Course materials include extensive use of popular French culture, including film.

157. French in France. An intensive, conversation-grammar review course at the intermediate level. Students stay for a month in the summer with French families in Rennes, learn about French culture, and have opportunities for side trips and tours to places of historical and aesthetic importance. (Higher-level students may register for FR 207.)

158. Francophone Studies. Francophone studies is a four-week summer course in French language and francophone culture given in a native French speaking country. (Higher-level students may register for FR 208.)

159. Paris and Normandy: Sites of Memory. Credit—2 hours. See course 213 for description.

NOTE: FR 200 and 202 are ordinarily prerequisites for all 200-level courses in French literature. Many 200-level courses are cross-listed with CLT and/or film and media studies, visual studies, women’s studies.

200. Advanced French. Intensive practice in speaking and writing the language; review of grammar on an advanced level. (Fall and Spring)

202. Introduction to Literature in French. Introduction to and intensive practice in the reading and interpretation of French, including materials from literature, the media, and popular culture.

204. Contemporary French Culture. An introduction to the social structures, institutions, and value systems which make up contemporary French society. Analysis of their manifestations in contemporary political structures and events, philosophy, art, film, the media, etc.

206. French Cultural Traditions. An introduction to pre-twentieth-century French culture. Topics include social, political, philosophical, and artistic movements across a variety of historical periods.
208. Francophone Studies. See FR 158.

212. A Course in French Translation. Intended for those who have some basis in the language (preferably intermediate level or above), who wish both to improve their comprehen-sion of the written text and to interpret it at an appropriate stylistic level through translation into English. The course is based on a great variety of the various, elementary to highly sophisticated, belletristic to scientific, selected both by the teacher and by the students.

213. Paris and Normandy: Sites of Memory. This course intends to explore the representations of Paris and Normandy (the landing beaches of Normandy) in literary and visual representations. Beyond the cultural riches of Paris and Normandy, this course intends to familiarize students with the complexities of cultural representation. It also seeks to provide students who are considering to study in Paris and Rennes with tools that will prepare them for the complexities of cultural encounters, that will prepare them for the excursions in the landing beaches of Normandy, a highly emotional and historical palace where the United States and France meet. This course is strongly recommended for students who plan on taking FR 157/207 (French in France). All other students are welcome. Reading list includes Les Lettres persanes (Montesquieu), Bel ami (Maupassant), Le Petit prince de Belleval (Calixthe Beyala). Films and videos include Saving Private Ryan, La Haine, Paris at the Time of Balzac, and more. Taught in French.

220. The Eighteenth Century Novel. Study of major authors of the French Enlightenment, as well as their predecessors and contemporaries, including Marivaux, Montesquieu, Voltaire, Prevost, Rousseau, Diderot, Sa, and Laclau.

230. The Nineteenth Century Novel. Topics in nineteenth-century French culture, especially those that consider the relations among the various literary genres and between these genres and other disciplines, e.g., visual arts, philosophy, history, music. (Fall)


233. Realists and Romantics. Nineteenth-century French literature witnessed two competing literary currents: romanticism and realism. Realism, heir to the logic and reason of the French Enlightenment, sought to rescue from scientific systematization the wonder and awe of nature; realism attempted to describe the world exactly as it was. This course examines the confrontation of these two movements, and attempts to discern what made each distinct, as well as what features they may unwillingly have shared. Do realistic novels romanticize their subjects? What’s true to life in romantic descriptions of nature? How do aesthetic concerns become social or political?

240. Le Roman Francais. This course looks at the history of the French novel, from its early history in the late seventeenth century, through the philosophic and great realistic traditions of the eighteenth and nineteenth centuries, and up to and including recent works of fiction. Also students study the form and function of the novel, as well as the narrative structures and forms of verisimilitude that authors chose to develop. Authors include Mme. de Lafayette, Voltaire, Diderot, Flaubert, Robbe-Grillet, and others. Readings and class discussion primarily in French.

243. Mutilated Bodies, Mutilated Discourse. “Transnational sisterhood” or cultural imperialism? Legitimate ritualized practice or outdated violent ritual? Genital cutting, female circumcision, female genital surgery? ... the controversy over this practice already begins with the act of its naming. Who is qualified to speak the truth about the assaulted female body? How can one explain the fact that Western feminist discourses and right-wing politicians tend to agree on the issue of genital mutilations? If there seems to be a consensus about the physical violence imposed on the female body, why is it that Western feminist discourse is suspected of perpetuating the mutilation of African voices? This course seeks to provide an understanding of the context in which a fragmented “transnational sisterhood” allows for a proliferation of mutilated discourses on mutilated postcolonial (African, poor, and defenseless) bodies. Readings include Alice Walker, Evelyne Accad, Faouzia Kassindja, and critical feminist readings from African, French, and North American authors. In English.

247. Black Paris. This course is a study of Black Paris, as imagined by three generations of black cultural producers from the United States, the Caribbean, and Africa. Paris is as a space of freedom and artistic glory that African-American writers, soldiers, and artists were denied back home. For colonized Africans and Caribbean, Paris was the birthplace of the Negritude, the ultimate cultural renaissance influenced by the Harlem Renaissance. From Josephine Baker, Richard Wright, James Baldwin to Shway Youngblood’s Black Girl in Paris, from Aime Cesaire to Maryse Conde, from Bernard Dadie’s An African in Paris to contemporary Franco-African writing, we investigate how the representation of Paris functions in the construction of black identities. Readings include Black Girl in Paris (Shay Youngblood), Desirada (Maryse Conde), The Josephine Baker Story, Paris Noir: African Americans in the City of Light (Tylor Stovall), An African in Paris (Bernard Dadie).

248. Poets and Painters. In this course students study the relationship between French poetry and painting from about 1808 to 1908, primarily focusing on the twentieth century. This course examines literary movements that affected painting and artistic movements that entailed new ways of writing. Through this course students can also examine other collaborative arts such as music, dance, and theater. Poets include Mallarme, Valery, Ponge, Michaux, Char, Jaccottet, Apollinaire, and less-known writers. Course and readings primarily in French.

260. The Twentieth Century. Topics in twentieth-century French culture, especially those that consider the relations among the various literary genres and between these genres and other disciplines, e.g., visual arts, philosophy, history, music. (Spring)

261. The Twentieth-Century Novel. A survey of the major literary movements of the twentieth century, with special attention to intellectual and social contexts that engendered them.

261A. The Contemporary French Novel. This course explores the development of the French novel from 1990 to today. Course, readings, and discussion are all in French.

264. Contemporary French Thought. This course is a survey of the major intellectual movements of the twentieth century. Begins with Ferdinand de Saussure and the study of the linguistic sign, then moves on to consider cultural anthropology and the invention of structuralism. Finally, the course takes a detailed look at Derridean deconstruction, the movement that has influenced so much Anglo-American criticism, and concludes with a brief foray into other forms of poststructuralism.

271. Introduction to Francophone Literature. This course surveys Francophone African and Caribbean literature from its beginnings in the 1940s to the postcolonial age. Study includes major trends and texts that have shaped the emergence of a genuine Francophone literary tradition. Issues of cultural confrontations, exile, panafricanism, diasporic migrations and interactions, race, class, and gender in African and Caribbean postcolonial societies are addressed through a close reading of texts. Movies are used as an integral part of this course and help in the understanding of the concept.

272. Madness and Postcolonial Literature. This course explores inscriptions of madness in postcolonial African and Caribbean texts. Beyond the obvious and visible signs of what is generally termed “madness” (from the pathological to the political or cultural), the course asks if the postcolonial arena can be interpreted as a pervasive manifestation of madness, that is to say, of something fundamentally alien, foreign to the Known, to the imperial destructuring order, and to the disarticulated colonial and postindependent communities.

274. Caribbean Novel and Theory. This course is a study of major Caribbean novels and major theoretical texts. The reading is structured around the notion of “Antillénité” or Creolization elaborated by Martinican Edouard Glissant and his heirs Chamoiseau and Confant of the “Créolité” movement. The
controversial presence of the Other (Africa and France) in the Caribbean, and the need to build a Caribbean authenticity in order to participate freely in what Gilsant terms “relation planétaire” (planetary relations) is also thoroughly examined.


276. Contemporary Women’s Writing and French Feminism. This course primarily deals with contemporary novelists and critics whose work focuses on gender and identity construction in a French/Francophone context. The course studies the changes in French feminism and women’s writing since 1968. A major focus of the course is the changing political and social role of women writing in French and how these voices differ from those of previous eras. Primary texts include works by Cixous, Kristeva, Ndiaye, Redonnet, Yourcenar, Wittig, and Le. Readings and discussions are in French.

277. Poststructuralism to Postmodernism. This course is designed to offer a critical examination of the major developments in French theory from poststructuralism to postmodernism. The course is organized around close readings of selected essays by authors whose work has had a powerful impact within the development of French thought and in the United States. Our readings focus on the relation of philosophy and critical theory to literature, history, politics, and power.

278. African Novel: Its Theory and Its Contexts. This course is a study of the Francophone African novel from north-sub-Saharan Africa and from Madagascar. The course explores the political and cultural contexts that gave rise to the modern African literature in general, and to the modern African novel in particular.

280. French Film: The New Wave. A study of French film from its beginnings through the New Wave.

281. History of French Film. This course surveys the history of French cinema from its early experiments through the “Tradition of Quality” to the moment immediately preceding the emergence of the New Wave. Films selected from the work of the following directors are studied: Lumière, Méliès, Gance, Duras, Léger, Clair, Vigo, Renoir, Carné, Ophuls, Pagnol, Clément, and Bresson. Readings include contemporary critical and theoretical discussions, as well as historical analyses.

283. Contemporary French Film. Through close analysis of popular film, this course explores contemporary French culture as it reworks national identity. Focusing on changing definitions of “Frenchness,” the course examines its articulations with shifting conceptions of tradition, of the popular, and of the nation. Readings include central cultural conflicts around identity and difference in the context of the emergent European economic community, as well as the specifically French context of “immigration” and “assimilation.”

389. Major Seminar.
391. Independent Study. Study of special linguistic or literary problems under the direction of a member of the faculty.
393. Senior Essay. A paper based on independent study: may be written by concentrators. Students should normally register for this course in the fall term of their senior year.

GERMAN

101. Elementary German I. Introduction to the structure of modern German and its basic vocabulary. Training in speaking, comprehension, reading, and writing through classroom instruction and recitation periods. (Fall)

102. Elementary German II. Continuation of GER 101. (Spring)

114. Conversational German. Emphasis on speaking skills with focus on current issues in German culture and society. Prerequisite: GER 102 or equivalent. May be taken concurrently with GER 151 or 152 may also be taken twice for credit. (Fall and Spring)

151. Intermediate German I. Focus on modern German culture and civilization. Special attention to grammar review, vocabulary, and reading skills. Prerequisite: GER 102 or equivalent. (Fall)

152. Intermediate German II. Continuation of GER 151 with ongoing grammatical review and increasing attention to conversation and composition. Prepares students for international “Zertifikat Deutsch als Fremdsprache” exam. (Spring)

157. German in Germany. Credit—6 hours (based on evaluation). An intensive program offered in German at all levels in Berlin, Germany, for one month in summer. Instruction by native Germans with University of Rochester faculty member in residence. Includes side trips and excursions in this historic area. Higher-level students may register for GER 207.

NOTE: GER 200 and 202 or their equivalents are normally prerequisites for all 200-level courses in German. Many 200-level courses are cross-listed with CLT and/or film and media studies, visual studies, women’s studies.

200. Advanced German. Readings on current issues. Objectives include enabling students to converse freely in German on a variety of topics and the review of grammar on an advanced level with particular attention given to writing style and idiomatic German.

202. Introduction to German Studies. This is one of several core classes required for the major. Students should have completed at least GER 152 and preferably GER 200. This course introduces students to basic principles of cultural analysis at the heart of the discipline of German studies. Emphasis focuses on how the media act to form and facilitate various aspects of issues in contemporary German culture.

203. Introduction to German Literature. Introduction to the interpretation of German literary texts with emphasis on the terms and techniques of analysis. (Fall)

204. Marx and Marxism. Who was this person, Karl Marx? Why is it that in this post-Cold War world his writings continue both to inspire and threaten contemporary readers? How have those inspired by Marx further developed his ideas to constitute the discourse of Marxism? The course begins with discussions of key works by Marx, then moves on to examine some significant contributions to Marxism.

205. Nietzsche and the Nietzscheans. Following chronological lines, a systematic introduction to Nietzsche’s writings, especially regarding the females and the feminine. The course does not focus on any particular aspect of Nietzsche, but attempts to cover the fundamental problems of Nietzschean philosophy.

206. Freud and Psychoanalysis. Freud is one of the most influential thinkers of the twentieth century. His groundbreaking work on dreams, the Oedipus Complex, and psychoanalytic methods have profoundly changed our understanding of the psyche and social interaction. This course provides a basic survey of Freud’s most important and often controversial writings/discoveries within their historical context and with regard to significant criticisms of his work. “Freud: An Introduction” is part of a cluster which includes courses on Marx and Nietzsche. (These courses need not be taken in any particular order.)

207. German in Germany. See GER 157.

209. The German Play. Close background study, interpretation, and performance of a German play, chosen from a group of readings selected according to interests, ability, and composition of the class. (Spring)

212. Monsters, Ghosts, and Aliens: From Schiller to Stephen King. This course focuses on the horror genre as popular entertainment in Germany, England, and the United States in the nineteenth and twentieth centuries. Particular attention is paid to the construction of others as monsters, ghosts, and aliens. Authors include: Schiller, Tieck, Hoffmann, Goethe, Droste-Huelshoff, Meyer, Shelley, Bradbury, Rice, and King.

220. Sexuality and Gender: Eighteenth-Century Representations. This course explores eighteenth-century conceptions/constructions of the body, sexuality, and gender as manifest in medical papers, handbooks, aesthetic essays, and literary works.

229. Kleist and Kafka. This course emphasizes the short prose of Kafka and Kleist, who provide literary representations of modern bureaucratic nightmares, of contemporary obsessions with the blurred boundaries between reality and fantasy, ailing artists, suffering male bodies, nonexistent or idolized women, guilt, and existential angst.
230. Poe and Hoffman: Uncanny Stories. This course focuses on the mysteries, horror stories, and “strange” short fiction of Poe and Hoffman. Students investigate generic and narrative structures as well as the vivid fantasies, dreams, visions, and psychological studies portrayed in the short stories of these two authors.

245. The Weimar Republic: Literature, Art, and Politics. 1918–1933. Focuses on relations between art and politics with special attention to Berlin as a cultural and intellectual center.

268. The Essential Goethe. Focuses on Goethe’s major achievements as a poet, literary critic, natural scientist, and statesman in Weimar.

272. Gender and Sexuality in the Twentieth Century. This course examines literary, artistic, and theoretical representations of gender and sexuality as they have changed in the course of the twentieth century. From the New Woman to French Feminists and transnational feminism, from homophile societies to “queer nation” and gay marriage, from Sigmund Freud to Michel Foucault and Judith Butler, the course explores the contested and politically charged debates around gender and sexuality that have shaped our views of identity over the last century.

283. Cinema and Revolution: The West German Avant-Garde. Dissent, violence, terror. This course explores the relationship between film and revolution in West German cinema from 1965 to the present. The course considers cinema’s potential as a revolutionary medium, while also focusing on how revolution is thematized and constructed in both fiction and documentary films. The course engages issues such as coming to terms with the fascist past, recreating the cinema as a revolutionary artistic form, feminism as a revolutionary perspective, the domestic sphere as a revolutionary space, and the co-optation of the cinema’s revolutionary potential through mass consumption. Each film is explored in relation to its sociohistorical context, providing students with an overview of German film and culture of the period.

284. Hollywood Behind the Wall: Intro into East German Cinema. The East German film studio, DEFA, was the second largest studio system in the former Eastern bloc and produced more than 650 films between the years 1946 and 1990. This course explores major developments in the East German cinema during the four decades of its existence. The course engages issues such as coming to terms with the fascist past, popular filmmaking and art cinema, cinema as a pedagogical tool, artistic dissent and state censorship, socialist ideologies of gender, and the politics of documentary. Each film is explored in relation to its sociohistorical context, providing students with an overview of East German film and culture. This course coincides with the University of Rochester’s fall film event, which features select films from East Germany, as well as guest appearances by East German film historian, Ralf Schenk, and director, Egon Günther.


287. Nazi Culture. This course uses the films of the Third Reich to examine the parameters of Nazi culture. It examines such diverse aspects as the Leader Principle, gender roles, racial hygiene, anti-Semitism, mass culture, propaganda, and visions of history. Films are analyzed both in terms of their aesthetics as well as the social and historical context of their production.

288. New German Cinema: From National to Transnational Productions. This course examines the aesthetic and technical aspects of German cinema as well as the historical and social context of its production. It explores the relationship between film, society, and culture. In examining the themes and forms of various filmmakers, students become acquainted with the issues and ways of seeing that have occupied the German public since 1945. As they hone their skills of cultural analysis and critique, they also gain insight into the general conditions of film production.

391. Independent Study in German. Senior Essay. A paper based upon independent study; may be written by concentrators, preferably in the fall term of their senior year.

399. Practicum in German. Investigation of special topics in German language, literature, or linguistics.

ITALIAN

101. Elementary Italian I. An introductory study of the structure of the Italian language with emphasis on speaking, reading, and writing skills. (Fall)

102. Elementary Italian II. A continuation of IT 101. (Spring)

111. Elementary Italian. The course offers an introduction to basic grammar with intensive training in speaking, listening, reading, and writing. It also guides students in the process of observation, experimentation, and discovery of the culture on the local level. (Spring: Arezzo, Italy)

114. Conversational Italian. This conversation course is designed to help students with some previous knowledge of Italian grammar develop facility with the spoken language. Emphasis is on vocabulary-building. Classes include debate, discussions, and conversations about current topics and aspects of contemporary Italian culture. Recommended in conjunction with any Italian course, except IT 101, for extra practice. May be taken twice. (Fall and Spring)

124. Italian Culture. The course aims at presenting various aspects of contemporary Italian culture to students with no previous knowledge of the Italian language.

151. Intermediate Italian I. Continuing study of modern Italian geared to enhance speaking, reading, and writing skills. Emphasis on grammar. Readings and discussions on topics of Italian history. (Fall)

152. Intermediate Italian II. Continuation of IT 151. Readings and discussions on topics of Italian geography and economy. (Spring)

153. Accelerated Italian. The course is equally focused on language skills and cultural awareness. While working on speaking, listening, reading, and writing, students research, experience, and then analyze various aspects of contemporary Italian culture. Daily newspapers and current magazines are among the course reading materials. (Spring: Arezzo, Italy)

154. Intermediate Italian II. Credit—6 hours. Prerequisite: IT 151. (Spring: Arezzo, Italy)

157. Italian in Italy. Credit—6 hours. The course presupposes full immersion in Italian language, culture, and lifestyle. Emphasis on communication skills, both oral and written, and on constant language practice in concrete, everyday situations. Visits to museums and excursions to various places of artistic and historic relevance constitute material for discussion and practice. (Summer: Padua, Italy)

159. Roman Structures: Engineering in the Classical World. This is an introductory course with no prerequisites and not calculus based. It begins with an intensive summer fieldwork in Rome and it consists of a study of Roman engineering focused primarily on civil engineering structures, and also including topics in mechanics, hydraulics, and materials. Modern theories in structural mechanics and strength of materials are used to analyze the practice, the achievements, and the limitations of Roman engineering.

190Q. Italian Regions: From Geography to History, from Language to Culture. While exploring the geographical and political configuration of the Italian territory, the course focuses on the Italian regions as discrete entities with their own historical, economic, linguistic, and cultural characteristics and on the multiple aspects of their urban and non-urban civilization. Among the topics of investigation are art, literature, and film; social, economic, and religious life; dialects; high cultural traditions and popular ones. Class taught in English, although students with basic knowledge of Italian have ample opportunity to practice and enhance their linguistic skills.

195Q. Divine Comedy I: Inferno and Purgatory. This course is the first segment of a two-semester sequence on the Divine Comedy. The purpose of the sequence is to introduce students to the liberal arts through one of the most significant texts in Western civilization. While reading about Dante’s adventurous journey from Inferno to Paradise, students gain a perspective on the Biblical, Christian, and classical traditions, and on the political, literary, philosophical, and theological dimensions of medieval European culture. The sequence also provides students with an avenue of investigation on the problem of knowledge—one of the poem’s central concerns—and guides them in developing critical tools and research skills. Continuation of Dante’s Divine Comedy II is recommended but not required.
196Q. Dante’s Divine Comedy II: Purgatory and Paradise. This course is the second segment of a two-semester sequence on the Divine Comedy. See description for IT 195Q.

200A, B. Italian Culture and Advanced Italian Language. Designed for students who already have a basic knowledge of spoken and written Italian, this course addresses different aspects of contemporary Italian culture. Two thirds of the course is taught in English and one third in Italian. Readings are divided accordingly between the two languages. Topics may include politics, economics, mass media, intellectual life, education, and popular culture. (Fall)

208. Advanced Tutorial in Italian. The course is designed for advanced students. It involves class practice and independent projects. (Spring: Arezzo, Italy)

222. Boccaccio’s Decameron. This course offers a close reading of a selection of stories from the Decameron geared towards understanding Boccaccio’s sense of the aesthetic experience and its cognitive value. Emphasis is on literary traditions, which the text absorbs and manipulates, and the medieval intellectual debates in which it engages.

223. Italian Trecento. Readings from Dante, Boccaccio, and Petrarch in the cultural context of thirteenth- and fourteenth-century Europe.

228. Italy from the Risorgimento to the Republic: 1815–1948. After a two-week introduction to contemporary Italian society, national and local political institutions, geography, and the historical development of the Italian peninsula from the fall of the Roman Empire to the French Revolution, the course takes a multidisciplinary approach to the study of united Italy’s political, social, and cultural history, through the adoption of the antifascist constitution of 1948. (Spring: Arezzo, Italy)

230. Italian Cities and Their Civilization. The course addresses aspects of the history, literature, art, politics, music, and folklore of a few major Italian cities such as Siena, Florence, Pisa, Rome, Naples, Palermo, Verona, and Venice.

234. Tuscan Painting and Social Change: 1300–1450. The course examines works of art as they might have been seen by learning how to read and interpret the complex elements at play beneath the immediate surface appearance of paintings and by exploring the universal unspoken language of signs and symbols used by artists. (Spring: Arezzo, Italy)

247. Modern Italy: From Renaissance to Unification. The objective of the course is to analyze the major intellectual and cultural phenomena that took place in Italy from the fifteenth to the nineteenth century; and the extraordinary impact that such phenomena had in the course of Western civilization. Readings include Boccaccio, Petrarch, Machiavelli, Castiglione, Ariosto, Tasso, Galileo, and Vico. The course consists of lectures and group discussions.

276. A Cultural Mosaic in an Inter-cultural Context. The course consists of four units taught sequentially by visiting faculty. Classroom instruction is enhanced by field trips. (Spring: Arezzo, Italy)

JAPANESE

101. Elementary Japanese I. Credit—6 hours. Introduction to colloquial Japanese, with emphasis on developing speaking and comprehension skills. The writing system also is introduced for reading simple texts. (Fall)

102. Elementary Japanese II. Credit—6 hours. Continuation of JPN 101. (Spring)

104. Elementary Conversational Japanese. Emphasis on speaking skills with focus on current issues in Japanese culture and society. Prerequisite: JPN 102 or equivalent. May be taken concurrently with JPN 105 or 106. May be taken twice for credit. (Fall and Spring)

151. Intermediate Japanese I. Credit—6 hours. Continuing study of colloquial Japanese through conversation practice and more intensive development of reading skills. Prerequisite: JPN 102 or equivalent. (Fall)

152. Intermediate Japanese II. Credit—6 hours. Continuation of JPN 151. (Spring)

190Q. Kyoto and Tokyo. This course examines the various forces that shaped Kyoto and Tokyo from the point of view of history, urban studies, religion, art, and literature.

202. Advanced Intermediate Japanese I. This course aims at a rapid improvement of students’ overall proficiency in the Japanese language. Listening and speaking skills are improved through assignments based upon audio tapes and videotapes, discussion, and role playing in Japanese. Prerequisite: JPN 106 or equivalent. (Fall)


204. Advanced Conversational Japanese. Provides students of JPN 202-level or higher with the opportunity to improve their speaking skills. Class activities include grammatical Oral drills (this is not a lecture course on the grammatical aspects of Japanese) and discussion of current issues. The class is conducted in Japanese, and might not benefit students who have already acquired near-native fluency. Prerequisite: JPN 152 or instructor’s permission. (Spring)

NOTE: Many courses above 204 are cross-listed with CLT and/or art and art history, film and media studies, women’s studies, history, religion and classics.

210. Introduction to Traditional Japanese Culture. Traces the development of the Japanese cultural tradition through the most prominent examples of its visual, literary, and performing arts. These include the poetry, courtly romances and scroll painting of the ancient courtiers; the poetry, Noh drama, and ink painting of the medieval samurai and Zen monks; the haiku poetry and art of early modern literati groups; and the poetry, kabuki theater, and print art of the new urban classes. Also examined are architecture, flower arranging, and the artistic complex of the tea ceremony. Emphasis is given to the social contexts of artistic expression.


219. Cartoon Connections: Manga and Anime. An exploration of Japanese popular culture as portrayed by the cartoon culture of manga (graphic novels) and anime (Japanese Animation). Material ranges from the origins of print and moving picture cartoon culture in the early twentieth century to the present. Issues addressed include national identity, global consumption, and genre cross-fertilization, providing an opportunity to explore how Japanese culture informs these now widely popular forms of popular entertainment.

220. The Culture of Urban Japan, 1650–1850. This course examines the spectacular urban culture of the Edo period against the background of new economic, political, and legal developments. Of special interest is the world of theaters and entertainment quarters that both reflected and supported the art and literature created by new constellations of social groups.

222. Noh Drama. In Western terms, Noh drama combines elements of classic Greek and medieval European drama with dance, music, and Christian rituals of confession, salvation, and redemption. As a dramatic form, Noh appropriates and integrates myth and legend, religious stories, historical chronicles, family histories, imperial lineages, and the institutionalized power of salvationary Buddhism. (Spring)

223. The Kabuki Theater. An introduction to the techniques, actors, and repertory of one of the world’s most brilliant theatrical traditions. Readings in translation and screenings include many of the greatest works of the classical kabuki stage.

232. Asian Calligraphy. East Asian calligraphy is the oldest continuous writing system in the world, and ranks as an art with poetry and painting. This innovative course joins the two components by offering one class period of writing with a licensed teacher of calligraphy, and one dealing with the history and art of calligraphy each week. Students must attend and are graded on both parts. The course is restricted to those who have completed at least one year of formal Chinese or Japanese language instruction. Enrollment is limited and preference will be given to those currently enrolled in Asian language study.

233. The Culture of Zen. Buddhism was the most important element shaping the culture of medieval Japan. This course examines the doctrines and the monastic and worldly practices of Zen Buddhism as they shaped the daily life, literature and drama, art and architecture, calligraphy, interior decoration, and tea ceremony of the period.
234. Haiku Poetry. Haiku poetry and its related art form, haiga ink-painting, were among the most important of the poetic and artistic genres of early-modern (1600–1900) Japan. This course studies the works of the great haiku masters Basho, Buson, Issa, and Shiki.

240. Masterpieces of Traditional Japanese Literature. The recent Japanese literary and cultural scene, with novels by Murakami Haruki (Norwegian Wood) and Yoshimoto Banana (Kitchen); films by Itami Juzo (Tampopo) and Morita Yoshiimitsu (The Family Game); manga from Tezuka Osamu (Phoenix) and Ikeda Ryoko (The Rose of Versailles) to the present; and anime from Otomo Katsuhiro (Akiira) on; and recent views of Japanese culture from at home and abroad. Other areas of interest include women’s and gay literature, “business novels,” and an examination of the role of the media in today’s consumer culture.


261. Kyoto. Credit—2 hours. This course examines the various forces that shaped Kyoto from the point of view of history, urban studies, religion, and art.

262. Tokyo. Credit—2 hours. This course examines the various forces that shaped Tokyo from the point of view of history, urban studies, religion, and art.

273. Japanese Women Writers. A critical and historical introduction to the works of Japanese women writers in a variety of genres from the early twentieth century to the present. Special focus is given to the major trends in the emergence of a women’s literary tradition, contemporary feminist issues, and the social, cultural, and ideological context (including issues of class, generation, sexuality, and nationalism) for women’s writing in Japan. Writers and works include Higuchi Ichiyō (“The Thirteenth Night”), Uno Chiyō (“Confessions of Love”), Enchi Fumiko (“The Waiting Years”), Tsuchima Yuko (“A Child of Fortune”), and Yamada Eimi (“Kneel Down and Lick My Feet”).

283. History of Japanese Cinema. A survey of Japanese cinema since its origins, this course examines the major issues, trends, and moments that make up its history. Content varies according to the particular timespan offered (origins to 1960s or origins to present), but significant topics addressed include silent film and popular culture; the import market and its influence; prewar, wartime, and postwar censorship; popular genres; animation; the early international festival circuit; the art film and New Wave; and patterns of global distribution and exchange. Course taught in English (additional instruction in Japanese available for majors).

284. Mobsters, Monsters, Swords. This course explores the origins and definition of (and relations between) a selection of genres, popular with both domestic and international audiences, that are commonly identified as synonymous with Japanese cinema. Examples include the chambara swordfight film (Seven Samurai), science fiction (Godzilla), the gangster film (the work of Seijun Suzuki), and animation. Also considered are issues of genre variation and transformation and, in some cases, resilience and perpetuity. Students are responsible for assigned readings and are required to attend screenings. Previous coursework in Japanese and/or film studies (theory, history, and analysis) is useful but not required.

285. Director: Akira Kurosawa. An intensive study of the films of Akira Kurosawa, whose work has so strongly informed the profile of Japanese cinema worldwide. Thanks to his prolific output, an analysis of his 50-year career until his death in 1998 offers the opportunity to examine many of the major cultural, political, and social issues and events that have left an imprint on the theory and production of film in Japan.

286. The Japanese New Wave. Novice studio and independent filmmakers altered the profile of Japanese cinema during the 50s and 60s. Paralleling the theoretical and pragmatic work of the French New Wave, they advocated filmmaking that would defy the status quo with a new political and social self-consciousness. This course studies the work of individuals (Oshima, Imamura, Teshigahara, and others) active in or associated with the Japanese New Wave.

287. Nagisa Oshima: Rebel Film. An intensive study of the work of Nagisa Oshima, who jump-started the 1960s Japanese New Wave. Influenced by the economic and political tensions of the 50s and 60s, Oshima’s early work as a writer/filmmaker “reframed” Japanese cinema so that independent filmmaking eclipsed the industrial status quo. After the death of Akira Kurosawa, Oshima is the last of the prominent film personalities acknowledged internationally in the post-postwar period to breach the millennium.

288. Director: Yasujirō Ozu. An intensive study of the work of Yasujirō Ozu (1903–1963), who defined the most enduring narrative genre in Japan’s visual media, the “home drama.” This course questions the myth as well as the historical reality of Ozu’s career. Why is he labeled “the most Japanese” of Japanese directors, and what does this mean? What do we make of the career of a stylistic “modernist” who transitions from gag comedy, gangsters, and social melodrama to nostalgia and family relations? How do Ozu films interface with the culture and society of twentieth-century Japan?

290. Women in Contemporary Japanese Film. Explores the representation of women in contemporary Japanese film. Begins with a sample of the prototype heroines (predominant in the films of Mizoguchi, Naruse, Ozu) who set the standard for what some Japanese critics describe as a “special Japanese brand of feminism,” which they call “the worship of womanhood.” Also examines genres based on gender-role archetypes and adaptations of women’s literature.

292. Japanese Animation (Anime). A study of anime as film form and cultural phenomenon. Course content varies, from a survey of the range of anime genres to the world views and visual sensibilities of specific directors like Hayao Miyazaki and Mamoru Oshii. Detailed analyses reveal the range and possibilities of anime and its place in popular culture on a local and global scale. This course examines the “nuts and bolts” of animated cinematic construction (use of narrative space, character design, etc.); methods of adaptation, influence, and genre variation; anime reception and fan culture; and issues of race, gender, landscape, genre, identity, and cultural conscience.


POLISH

101. Elementary Polish I. The main objective of the Elementary Polish course for beginners is to provide the basic uses of Polish syntax, the cases, and prepositions as well as the word-formative process. Polish grammar is presented as an integral part of the basic textbook. Two consecutive semesters of Elementary Polish will include sounds and spellings and relationships between sounds and inflection as well as basic knowledge of Polish nouns, pronouns, adjectives, numbers, and verbs.


103. Polish Review. Builds on basic speaking and conversation skills learned in introductory-level Polish courses taken at the University of Rochester or at study abroad programs.

151. Intermediate Polish. While the main focus of the Elementary Polish course is the word-formative process, the basic use of the cases and prepositions as well as the essential aspects of Polish syntax, the intermediate course focuses on active use of contemporary Polish, written and colloquial. The main objective, based on basic knowledge of grammatical rules is to achieve independence in communication. Summer courses of the Polish language in Krakow, facilitated by the Skalny Center for Polish and Central European Studies at the University of Rochester, are highly recommended after completion of the intermediate course.
RUSSIAN

101. **Elementary Russian I.** An introduction to Russian grammar, phonetics, and conversation. Emphasis is on practical Russian language skills. (Fall)

102. **Elementary Russian II.** Completes the introduction to Russian grammar, phonetics, and conversation begun in RUS 101. Students also view and discuss video clips in Russian. (Spring)

114. **Russian Conversation.** Students cover various topics aimed at improving conversational skills in everyday situations. Prerequisite: RUS 152 or permission of instructor.

123. **Russian Life.** The culture and history of everyday life in Russia.

124. **Background Studies in Russian.** Taught by a native speaker of Russian, this course is intended for those with a minimum of one year of college-level Russian. It is structured around Russian film and TV broadcasts and other authentic Russian-language materials. It offers the students the chance to improve their comprehension and speaking skills. Those taking the course for credits also work on additional written assignments in consultation with the instructor. Class taught in English.

126. **Russia Now.** In this expanded 4-credit version of the 2-credit Russia Now course, students examine the background to post-Communist Russia.

127. **Russia Now.** Credits—2 hours. Students follow current events in Russia through the Internet, newspapers, magazines, and other sources. This course is designed to (1) familiarize students with the most important issues facing Russia today and the historical/political/cultural context in which to place them; (2) to acquaint students with a variety of resources from the United States, Russia, and a number of other countries and the different perspectives these may give on the same issues. Class taught in English.

128. **Russian Civilization.** Russian civilization from its beginnings a thousand years ago to the present day. Each unit covers historical and cultural background as well as literary texts. National “myths” that govern the Russian state are examined. Traditional tensions in Russian civilization which prevail today, such as those between chaos and order, foreign influence and a strong national identity, innovation and tradition, and between radical skepticism and faith, are analyzed. Readings include Russian fairy tales and saints’ lives, excerpts from the autobiography of the seventeenth-century heretic Avvakum, tales by Pushkin and Gogol, one of Dostoevsky’s most powerful and influential novels (Dervils: The Possessed), and a wide range of materials from the twentieth century.

129. **Russian Culture.** A series of lectures, films, excursions, and field trips designed to acquaint students with contemporary Russian culture and political issues held in St. Petersburg. (Summer)

151. **Intermediate Russian I.** Emphasis on reading, writing, conversation, and further development of grammatical concepts introduced in first-year Russian. The building of vocabulary and comprehension skills is also stressed. (Fall)

152. **Intermediate Russian II.** Continuation of RUS 151. Grammatical review and increasing attention to conversation and composition. (Spring)

157. **Russian in Russia.** Russian in St. Petersburg. An intensive, conversation-grammar review course at the intermediate to advanced level held at the University of St. Petersburg. (Summer)

190Q/235. **Tolstoy’s War and Peace as Novel, History, and Film.** A semester-long exploration of the world of War and Peace. The class works its way through the novel (in English) over the term, while looking at materials that help “unpack” it, including historical accounts of the same events and attempts by Russian, English, and American directors to capture the essence of the novel on film.


202. **Advanced Readings in Russian.** Students read, discuss, and write about a selection of Russian texts, poetry, and prose of various periods. (Spring)

204. **Conversational Russian.** For students who have completed at least two years of Russian.

207. **Advanced Russian in St. Petersburg.** For students who have completed at least two years of Russian.

209. **Topics in Advanced Russian Grammar.** Intensive work in various topics in Russian grammar and syntax at the advanced level with emphasis on practical applications.

212. **Advanced Literature and Culture in Original.** This course is designed for students who can read Russian at an advanced level and wish to pursue particular areas of interest. Students meet individually each week and periodically as a group, and write essays in Russian on their area of interest.

224. **Russian Art.** This course focuses on the history of Russian art and architecture from the Christianization of Russia through the twentieth century. Students learn how to read icons, discern the major features of Russian churches, and follow the development of Russian painting from the age of realism to modern times. The course is taught with reference to the major events in Russian history. No knowledge of Russian is required.

231. **Great Russian Writers.** A survey of the works by Russia’s greatest writers of the nineteenth century. Readings include Pushkin’s novel in verse Eugene Onegin, Lermontov’s Hero of Our Time, Gogol’s comic narrative Dead Souls, Goncharov’s Oblomov (about a man who cannot get out of bed), short works by Dostoevsky and Tolstoy, and a play by Anton Chekhov. Each work is examined within the context of Russian literary and cultural history, paying particular attention to questions of structure and theme.

237. **Dostoevsky.** A variety of works are read, culminating in Dostoevsky’s last and greatest novel, The Brothers Karamazov.

240. **Topics in Nineteenth-Century Russian Literature and Culture.** Undergraduate seminar.

243. **Chekhov and His Contemporaries.** The climax of Russian civic, lyric, and psychological realism in the works of Chekhov, Tolstoy, Bunin, Gorky, and others. Symbolism as a reaction to realism and as the beginning of literary modernism in Russia.

246. **The Image of Christ in Russian Literature.** The image of Christ has dominated Russian art and culture for a thousand years. Indeed, it may even be argued that Russian literature began with Jesus Christ, for in its earliest forms—the numerous accounts written of saints’ lives—it dealt with little else than living in accordance with the words and deeds of Christ. After briefly setting the context, the course focuses on the nineteenth and twentieth centuries, exploring the extraordinary range of poetic encounters with the figure of Jesus in works by Tolstoy, Dostoevsky, Aleksandr Blok, Anna Akhmatova, Mikhail Bulgakov, Boris Pasternak, and Venedikt Erofeev.

247. **Secret Nation.** The cult and culture of secrecy in Russia from Ivan the Terrible to the present. This course uses materials from a variety of disciplines to give a broad yet richly detailed picture of the information that was hidden, and the means by which this was accomplished. The official secrecy that was a defensive strategy came to undermine the state it sought to protect. The semester ends by examining the legacy of secrecy in post-Soviet Russia.

248. **Politics of Identity.** Competing identities in the Russian Empire, the U.S.S.R., and post-Soviet Russia. Includes Dostoevsky, Babel, Mendeleson, Tertz, and Rasputin.

250. **Topics in Twentieth-Century Russian Literature and Culture.** Undergraduate seminar.

254. **Writers in Exile: Russian Literature Outside of Russia.** Some of the greatest literature by Russian writers of the twentieth century was written outside of Russia, sometimes not even in Russian. It was written by writers who fled abroad after the October Revolution in Russia in 1917 or who were later expelled by the Soviet authorities. This literature—banned in the Soviet Union until a few years before its collapse—constitutes a unique body of fiction that exists on the border between two cultures: that of the
writers’ abandoned Russian homeland and that of their adopted home country. This course provides a survey of the most prominent authors and works of this literature in exile.

265. Russian Literature Between the Revolutions: 1917–1991. The fall of the Soviet Union in 1991 not only marked the end of a social(ist) experiment, but it also closed a period in Russian cultural history. This course looks at the best Russian fiction of the Soviet period, including utopian and anti-utopian works, fantastic satire, prison camp literature, village prose, urban prose, and the “chernukha” (sensationalist art) of the immediate post-Soviet period.

267. Russia Goes to the Movies. The dawn of the age of movies coincided with the Russian Revolution, and film was Lenin’s favorite art form. The course surveys Russian film from the beginnings to the present. The course investigates the major role that cinema played in shaping the national and political identity of the Soviet Union, and looks at what was artistically interesting and popular about these films, some of whose directors, like Eisenstein and Tarkovsky, are among the world’s most influential filmmakers.

289. Dangerous Texts: Literature and Politics in Russia. The course examines “dangerous texts” from the seventeenth century to the present to see how texts and authors were seen as threats to the state and explores ways in which writers perceived themselves as a “second government” and how this affected their writing. Readings include Avvakum, Radishchev, Pushkin, Turgenev, Dostoevsky, Mandelstam, Solzhenitsyn, Voinovich, and Sinyavsky/Tertz.

391. Independent Study.

393. Senior Essay. A paper based upon an independent study; required of concentrators.

SPANISH

101. Elementary Spanish I. Intended for students with no background in Spanish, or whose background does not make placement in a higher-level course advisable. Training in speaking, comprehension, reading, and writing through classroom instruction and recitation periods. Students must also register for an associated recitation section. (Fall and Spring)

102. Elementary Spanish II. SP 102 continues the work of the beginning course SP 101. There is added emphasis on reading comprehension, vocabulary building, and culture. Students must also register for an associated recitation section. (Fall and Spring)

151. Intermediate Spanish I. Continuing study of modern Spanish in its spoken and written forms. Emphasis is given to cultural and literary readings and discussions, as well as basic composition writing skills and Multimedia Center activities related to the text. (Fall and Spring)

152. Intermediate Spanish II. Continuation of SP 151. Intended to advance conversational skills and refine writing techniques through cultural and literary readings, discussions, and Multimedia Center assignments related to the text.

157. Spanish in Mexico. Study Spanish conversation and culture in Mexico. Program fee includes instruction at Cultural Institute of Oaxaca, family stay and partial board, interviews with and demonstrations by local artisans, some excursions. (Summer)

200. Advanced Spanish Composition. This course is designed to refine the student’s writing and reading skills in Spanish in preparation for entering upper-level Spanish courses. The class time and the assignments are divided between developing composition-writing skills, a variety of readings in Hispanic literature and culture, and some review of targeted grammatical structures. Class taught in Spanish. (Fall and Spring)

201. Advanced Spanish Language and Composition for Native Speakers. This course is designed for students whose first language is Spanish, those who are bilingual, and Hispanic heritage students. The primary goal is to develop skills based on the academic expository writing expected in upper-level literature, culture, and linguistics courses. Class time is devoted to analyzing the texts on which composition assignments are based, including journalistic selections and representative pieces from all literary genres. Discussions focus on structural and lexical aspects of the Spanish language relevant to the written assignments, and on the process of writing (from thesis to final draft).

NOTE: SP 202, 203, and 204 are offered in this order in successive semesters. SP 200 or 201 is a prerequisite to all courses.

202. Intro to Modern Spanish Literature. Introduction to key works of nineteenth- and twentieth-century Spanish literature, including short fiction, theater, and poetry. Emphasis is on terms and techniques of literary analysis, and on the texts themselves within the changing culture of modern Spain. Class taught in Spanish.

203. Early Hispanic Texts. This course features early-modern Hispanic texts of both Spain and Spanish America. It concentrates on the literature of the sixteenth and seventeenth centuries with works such as the Lazarillo de Tormes, the Novelas Ejemplares of Cervantes, the poetry of Sor Juana Inés de la Cruz, and colonial texts included. Class taught in Spanish.

204. Spanish-American Literature: 1800 to Present. The course provides a representative survey of Spanish-American literature from Independence (nineteenth century) to the present within a cultural-historical framework. Works covered include poetry, prose fiction, and theater. Emphasis on textual analysis, with attention to diverse traditions and cultures of Spanish America. Class taught in Spanish.

205. Spanish Culture. This course explores the history and cultural development of modern Spain through a variety of media such as art, literature, and film. Although topics range from the early cultural life of the peninsula to the implications of the expulsion of Moslems and Jews, and from Spain’s overseas empire to the Spanish Civil War, emphasis is placed on contemporary issues, such as Basque separatism, the European Union, hosting the Olympics, and immigration. Class taught in Spanish.

206. Spanish-American Cultures. This course explores the ideas and events shaping the culture(s) of Spanish America, from pre-Columbian times to the present, with an emphasis on the concepts of discovery, conquest, mestizaje, and the formation of national cultural identity. Strong consideration is given to contemporary issues. Texts are drawn from literature, sociology, anthropology, history, the arts, and film.

207. Spanish in Mexico. Please see SP 157 for the course description. Students in SP 207 enroll in advanced-level courses in language, literature, and culture at the Institute in Oaxaca. (Summer)

NOTE: Many courses numbered SP 215 and above are cross-listed with CLT and/or film and media studies, women’s studies.

215. Don Quijote. This course entails a close reading of the novel in English translation, coupled with a focus on the ways in which both the novel and/or the protagonist have been adapted, adopted, interpreted, or incorporated by various critical and popular traditions both inside and outside of Spain from the time of its original publication in 1605 through the twenty-first century. The course examines several filmic adaptations, illustrations, and paintings as well as with an eye toward critically examining the problematic achievement of Don Quijote as an icon of pan-Hispanic culture. However, students continually return to the novel as their anchor throughout the course, while assessing the constantly changing ways in which contemporary readers and scholars approach the text.

Course is taught in English.

216. The Picaresque Novel. Conducted in English, with readings in the original language or in English, the course investigates the Lazarillo de Tormes, Mateo Aleman’s Guzman de Alfarache, Quevedo’s Buscon, Grimmelshausen’s Simplicissimus, Defoe’s Moll Flanders, Smolet’s Roderick Random, Le Sage’s Gil Bias, and Thomas Mann’s Felix Krull in an attempt to determine whether there is a picaresque genre and to explore the dialectic between morality and criminality in the growth of the early European novel.

217. El Quijote. A reading of Parts I and II of the novel. The basic assumption is that Don Quijote constitutes the richest and the most authoritative statement about the theory and practice of fictitious prose narrative and that it fully anticipates all the major developments in the novel in the West in the seventeenth,
eighteenth, and nineteenth centuries. Class is taught in Spanish.

218. Cervantes and the Rise of the European Novel. Theoretically and practically, the writings of Cervantes constitute the most persuasive and authoritative model for the art of fictional narrative in the West. Cervantes went to Great Britain and thence to the continent above all through the agency of the Quijote. Readings include Don Quijote in terms of its European futurity, passing from it to Defoe (Rob Roy, Rasselas), Fielding (Tom Jones), Scott (Rob Roy), Dickens (Our Mutual Friend), and, finally, Balzac (Lost Illusions). A critical constant in the course, conducted in English and with the readings in Spanish, French, or English according to students' language competence, is the question of artistic propagation and descent in the novel.


222. Spanish-American Colonial Literature. This is more a literary than a historical investigation of the period. The emphasis is on the experience of otherness in major texts such as Nunez's Navajas, Escarda's Araucana, Garcia's Comentarios Reales, and the poetry of Sor Juana Ines de la Cruz. Class taught in Spanish.

230. Nineteenth-Century Spanish Prose. Examines the nineteenth century as a time of confrontation and contradiction; as a bridge between tradition and modernity, reason and superstition, cultural affirmation and revolution. Explores Spanish culture from the early 1800s through the crisis of 1898 in a broader European cultural context. There is a selection of texts representing the movements of romanticism, costumbismo, realismo, and naturalismo. Class taught in Spanish.

231. The Generation of 1898 and Modernismo. In both Spain and Latin America the closing years of the nineteenth century and the dawning of the twentieth demanded critical revisions in the areas of politics and aesthetics. Intellectuals—writers, artists, and musicians alike—confronted the "ruins" of the past, seeking in their place new expressions of sublime beauty, liberty, spirituality, and sensuality. Revision or destruction? Tradition or innovation? Nationalism or "Enlightenment"? Woman as angel or demon, muse or serpent? From Nicaraguan Ruben Dario to Cuban Jose Marti, and in Spain from Valle-Inclan to Unamuno, this course explores the creation of the "fin de siglo" subjectivity in its multiple forms during the "decadent" transition from the "old" to the "new." Class taught in Spanish.

245. Twentieth-Century Spanish Theater. Explores trends in Spanish theater from the early twentieth century (Valle-Inclan, Garcia Lorca, Benavente) through post-Civil War censorship (Casals, Buero, Sastre, Arrabal, Ruibal) to the most recent innovations at the millennium (Ana Diosdado, Antonio Gala, Francisco Nieva, Paloma Pedrero, etc.). Also considers cinematic versions of plays to compare techniques and forms of performance and representation. Class taught in Spanish.

246. Modern Spanish Prose. Examines developments in the Spanish novel after the Civil War, from its resurgence with Cela to the experimental novels of the 1960s and 1970s, then the eutrophic texts of the post-Franco transition to democracy. Emphasis on confrontations between social and aesthetic considerations in the texts. Readings include works by Cela, Matute, Goytisolo, Martin Gaite, Tusquets, Benet, Perez-Reverte and Javier Marias. Class taught in Spanish.

247. Modern Spanish Poetry. Analysis of selected works of poetry from the generation of 1927 to the present. May include readings by Juan Ramon Jimenez, Rafael Alberti, Jorge Guillen, Federico Garcia Lorca, Luis Cernuda, Pedro Salinas, etc. Class taught in Spanish.

248. Spain's Transition to Democracy. The process of redefining national, regional, and cultural identities in Spain since the death of Franco in 1975 parallels and even prefigures the collapse of the Berlin Wall and the map of the world drawn during the Cold War era. Spain's transition from dictatorship to democracy involves a complex number of issues, including the legalization of opposition political parties, a new constitution, King Juan Carlos halting a rightwing coup, the election of Felipe Gonzalez and the Socialists in 1982, and the advent of a united continent. The mass media have played a central role in this transformation, as evidenced by the film industry in particular as exporter of the icon of Modern Spain as a cultural commodity in the New Europe. This course focuses on representations of nationalism, autonomous identities, and alternative aesthetics in post-Franco Spain in a variety of media. Class taught in English.

249. Topics in Spanish Literature and Culture. Topics vary and may include Cervantes' "novelas ejemplares," the visual arts and the Spanish Civil War, the works of Garcia Lorca and Salvador Dalí, Spanish women's writing, and other topics that consider the relations between literature and other disciplines (film, philosophy, history, music, etc.).

249A. Stories from Spain. This course examines a variety of realist novels, psychological thrillers, erotic tales, heroic narratives, and coming-of-age tales from nineteenth- and twentieth-century Spain. Discussions concentrate on the evolution of twentieth-century democracy—the Spanish Civil War, the death of Franco, the Constitution of 1978, women's rights movements, and hopes for modernization. Through the literary reflection of social issues, political dreams, and the limits of "everyday" language and literary conventions in order to give original expression to both private passions and public conflicts and to challenge the boundaries between the arts. This course studies major works and the cultural contexts of ground-breaking voices from a variety of Spanish-American countries; Pablo Neruda, Cesar Vallejio, Alfonso Storni, Rosario Castellanos, Jorge Diaz, Griselda Gambaro, and Jose Triana. Class taught in Spanish.

250. Latin American Theater and Poetry. This course examines Latin American intellectuals, activists, and feminists in the context of the challenges of the global economy. In the twenty-first century, how do these women envision their future? How do they see themselves? What role does immigration play in their lives? The course examines the ideas of intellectuals, politicians, and the popular classes in Latin America regarding their own societies and the U.S. Includes photographic, cinematic, and written texts. Issues of sexuality, education, the family, and culture are considered in readings, films and videos, art and music, and in conversations with guest speakers. Class taught in English.

250A. Latin American Women Writers. Through study of texts (mostly novels) written by women from Latin America, broad questions concerning cultural identity with respect to sexuality and gender, language, aesthetics, psychology, and social issues are addressed. The course uses materials from a variety of fields (literary and cultural theory, film studies, psychology, history, sociology, anthropology, feminist studies) in addition to the primary texts. All texts and discussions in English. Emphasis on collaborative research and progressive writing assignments.

251. Facing Facts: Nonfiction Writing in Twentieth-Century Latin America. This course surveys the period's social and political upheaval in Spanish America. It is well documented by a variety of texts that claim to tell the truth about historical events. Many of these texts acquire the status of "literature" and not mere "reporting." This course asks the following questions: How have Spanish-American writers constructed factual, truth-telling texts? What impact has photography had on the writing of nonfiction? What expectations do we as readers bring to document-
tary literature? How are the lines drawn—and blurred—between factual and fictional discourses? Readings are chosen to represent revolutionary Mexico, labor struggles of the 1920s, revolutionary Cuba, the repression in the Southern cone, the Central American insurgencies, and the survival of indigenous cultures. Class taught in English.

262. Topics in Spanish-American Literature and Culture. Topics vary from semester to semester. Possible topics include surrealism and the avant-garde in art and Hispanic literature, Mexican literature and culture, the Caribbean, and other areas of interdisciplinary study.

262B. Cuba XXI: The Utopian Island. Now that the twenty-first century has arrived, we cannot help but picture a Cuba “without Fidel.” But what does that mean? How do those in Cuba imagine their nation down the road? How does the Cuban community in Miami represent its hopes and dreams? This course examines art, film, and literary texts from the “homeland” and from the diaspora to compare and contrast images that negotiate between the past and the future. Course taught in English. Readings may be done in English or Spanish (for SP credit).

262D. Culture and Literature of the Caribbean. This course focuses on the Spanish-speaking Caribbean within the larger cultural, historical, and political context of the Caribbean Basin. The course examines indigenous, European, and African influences on the molding of national cultures and identities as found in literary, cultural, and theoretical texts. Readings include examples from modern and contemporary Cuba, Puerto Rico, the Dominican Republic and Yucatan. Writings of Nicolas Guillen, Eugenio Maria de Hostos, Jose Marti, Roberto Fernandez Retamar, Ana Lydia Vega, and writers and artists of the Caribbean diaspora. Class taught in Spanish.

270. Hispanic Short Story. This course examines the particular aesthetic and formal challenges of the short story genre in texts from both Spain and Latin America. From realism to science fiction, and from the humorous to the grotesque, the course explores the narrative possibilities of a variety of short texts. Authors include Clarin, Quiroga, Tusquets, Cortazar, Borges, Chacel, Moix, and others. Theoretical issues related to the short story are discussed along with primary texts. Class taught in Spanish.

271. Popular Culture in Hispanic Societies. A consideration of popular genres such as the comic, the detective story, the fotonovela, the teledic, and the novela rosa within a broader Hispanic cultural context. Examines popular interpretations and reflections of high culture and the crossovers between them. Considers the subversion of popular genres, the function of satire and parody, and intertextual relations in order to discuss the uses, abuses, and mass consumption of these products. Theories of popular culture are compared and contrasted; texts drawn from both written and visual sources. Class taught in English. Readings and papers may be done in Spanish (for SP credit).

272. Visions of the Millennium. Dead end or new beginning? Our fantasies about the future have met reality face to face as we crossed into the twenty-first century: Will we now inhabit a utopia of science and technology? Or will we live amidst the ruins of our worst social and ecological nightmares? This course examines how a variety of cultures across Europe and the Americas envision the future and what images they use to represent hopes, dreams, and fears. Includes a variety of sources, from written texts to the arts and film. Course taught in English.

281. Other Bodies. This course examines the representation of radical otherness in what is frequently represented as a single homogeneous body of Hispanic culture. The politics of reading, the problematizing of deviance and pornography, the narration of sexual and ethnic difference, and the quest for less rigid forms of subjectivity are some of the issues explored. Readings include texts by Goytisolo, Donoso, Puig, Zapata, Tusquets, Garcia Lorca, Peri Rossi, and Castellanos; films by Pedro Almodovar, Eloy de la Iglesia, and other directors from the Americas and Europe. Course taught in English.

282. U.S. Latinos/Latinas. This course introduces students to the emergent field of U.S. Latino/Latina writing and culture. The course examines two among the many provocative questions for the twenty-first century: (1) What will be the effects of further Latinization of the American urban landscape and (2) What does “bustin’ America” mean for different cultural groups and social classes? Readings and discussions include: Mike Davis (Magical Urbanism: Latinos Reinvent the U.S. Big City); Junot Díaz (Drown); Sandra Cisneros (The House on Mango Street); and texts by Piri Thomas, Julia Alvarez, John Rechy, Ana Castillo (The Goddess of the Americas), Richard Rodríguez (Days of Obligation), Rodolfo Acuña, Helena Maria Viramontes, Gustavo Pérez Firmat, Ilan Stavans, and others. Class taught in English.

287A. Mexican Film. From the very first encounters, the Americas excited in the outsiders’ imagination a host of mythical and legendary images. While the first such crisis of representation occurred in other forms and texts, in the twentieth century the cinema has been the medium of cultural encounter and resistance. This course examines a variety of films produced by and about Latin America, its history and inhabitants. Questions of self-representation, cultural boundaries, gender identities, and the image of the nation are explored, as are issues of commercial cinema versus the art film. Topics vary from semester to semester. Class taught in English. Written work in Spanish for Spanish credit.

MUSIC

Paul Burgett, Ph.D. (Eastman School of Music) Adjunct Professor of Music
John Covach, Ph.D. (Michigan) Professor of Music and Chair of the Department; Professor of Music Theory, Eastman School of Music
David Harman, D.M.A. (Eastman School of Music) Professor of Music; Director of Orchestral Activities, the College
Kim H. Kowalke, Ph.D. (Yale) Professor of Music and Richard L. Turner Professor of Humanities; Professor of Musicology, Eastman School of Music
Honey Meconi, Ph.D. (Harvard) Professor of Music; Professor of Musicology, Eastman School of Music
Matthew BaileyShea, Ph.D. (Yale) Assistant Professor of Music; Assistant Professor of Music Theory, Eastman School of Music Alvin Parris, B.A. (Eastman School of Music) Director of the Gospel Choir William Tiberio, M.M.E. (SUNY, Fredonia) Director of the Wind Symphony Zora Mihailovich, Artist-in-Residence Additional faculty members, Eastman School of Music

The department uses four to six advanced graduate students from the Eastman School of Music as teaching assistants, lecturers, or musicianship instructors.

The Department of Music offers courses of study leading to the B.A. degree with a concentration, a minor, and eight clusters in music. A wide variety of nontechnical courses addresses nonconcentrators who wish to study music on an introductory, interdisciplinary, or aesthetic basis. Degree programs, course offerings, and performance opportunities in music are diverse and invite choice and flexibility. Courses offered at the Eastman School of Music (ESM), normally open to any student presenting the proper prerequisites, augment the range and depth of musical experiences and courses available to students in the college. (For information concerning the Bachelor of Music degree and courses offered at Eastman, consult the Eastman School’s official bulletin.)

MUSICAL ENSEMBLES AT THE RIVER CAMPUS

Currently, more than 400 students participate in nine musical ensembles that present approximately 40 concerts each year. Symphony orchestra, wind symphony, chamber orchestra, jazz ensemble, men’s chorus, women’s chorus, and chamber singers are offered for credit and can be applied toward a concentration in music. Concentrators can also participate in chamber ensembles and/or gospel choir with or without credit, though neither of those ensembles counts toward fulfillment of the ensemble requirement. Students in any college of the University are eligible to audition for musical ensembles on the River Campus. Music ensembles may be repeated for credit; a maximum of 8 credit hours may be counted as electives toward the bachelor’s degree.

In addition, there are a number of student-organized musical groups.

PRIVATE INSTRUMENTAL AND VOCAL INSTRUCTION

Credit Lessons Any full-time, matriculated student may audit: lessons at the Eastman School of Music. Minimum standards of proficiency are established by the various Eastman departments; students demonstrating those standards may take lessons for collegiate credit. The music department’s concert manager provides the required audition application on request.

Most students meet with their instructors once a week for 30 minutes, receiving 2 credits for lessons. Students who qualify for one-hour lessons may be awarded additional credit. The addition of private lessons to a normal 16-credit-hour semester is not considered an overload, and there is no fee or additional tuition charge. No more than 16 credit hours may be counted toward the B.A. degree.

Noncredit Lessons Students may take lessons without credit by enrolling directly in the Eastman Community Music School (ECMS). Cost of this instruction is not included in regular college tuition; students are billed directly by the Eastman School. College credit will not be awarded for these lessons nor will such lessons appear on the student’s permanent record at the University. However, ECMS awards grades for all study; and a transcript of such study is available through ECMS.

Practice Facilities Practice facilities on the River Campus are open to members of the University community. Keys are available in the music department office.

THE B.A. WITH A CONCENTRATION IN MUSIC

The College music department offers the Bachelor of Arts degree with a concentration in music. This degree program in music addresses students who can meet both the intellectual and musical challenges of a rigorous program that emphasizes the broad experience of a liberally educated person. The concentration comprises a balanced program of academic courses, private instruction, and ensemble experience that fosters understanding of musical languages, historical developments, and compositional styles while encouraging excellence in performance. The core curriculum in music theory and history provides the common foundation for advanced study of specialized tracks within the concentration (composition, conducting, music history/theory, music in world cultures, musical theater, performance, and popular music/jazz) and excellent preparation for study at the graduate or professional level. Information about the honors program is available from the department office.

Although the concentration in music is a demanding one, students often also explore, beyond the introductory level, one or more nonmusic disciplines. Some students pursue a double major.

Students who concentrate in music in the B.A. program at the University of Rochester usually demonstrate significant prior musical experience. Applicants to the College who are considering a concentration in music are encouraged to submit a recorded audition as part of the admission process so that musical achievement can be considered in the admission decision and the student can be advised of placement in private instruction at the Eastman School; pianists can often audition in Rochester and should contact the department office to schedule an audition. Students are admitted to the music concentration by the music faculty after a review, usually in the sophomore year, of their academic records and musical progress. Before they are admitted to the concentration, students must have completed one semester of music history and have completed or be concurrently enrolled in MUR 211.

THE B.A./M.A. PROGRAM IN MUSIC EDUCATION WITH TEACHING CERTIFICATION

The College music department and the Eastman School’s music education department offer an option allowing a limited number of undergraduates to get an early start on a Master of Arts degree in music education at Eastman. The program normally takes five and one half to six years to complete. Along with the master’s degree, students also receive initial certification for teaching music in the New York State public school system. Interested students should consult a music department advisor in their first year at the University. Students apply for the M.A. degree during the second semester of the junior year. Details of the program are available from the music education department at the Eastman School.

THE 3 + 2 B.A./M.A. PROGRAM IN ETHNOMUSICOLOGY

Students complete the theory, history, musicianship, and keyboard skills requirements, and performance requirement (studio instruction and ensembles) of one B.A. music track. An audition admission/interview at Eastman is required as part of admission to the Master of Arts degree. The requirements for the M.A. include courses in musicology, ethnomusicology, ethnography, world music ensembles, one language, and elective courses, as well as a thesis of 50–100 pages and an oral exit examination.

REQUIREMENTS FOR THE MUSIC CONCENTRATION

A concentration in music comprises 61–71 credits, depending upon background, precollege preparation, and the particular track selected. All music concentrators are required to take the core courses as listed below. Requirements for ensemble, private instruction, and electives vary with the track. The core courses include


2. Music history (20 credits): MUR 221, 222, 223, 224. Note that MUR 221 and 222 are offered in one academic year, with MUR 223 and 224 being offered the next, although students can begin the sequence with either MUR
221 or 223. Students need to plan their schedules accordingly.
3. Ensemble (four semesters in a faculty-directed ensemble sponsored by the College music department). A maximum of 8 credits may be counted toward the B.A. degree.
4. Private instruction (four semesters).

Upon presenting a successful audition, full-time matriculated students are assigned studio instruction at the discretion of the dean of academic affairs at Eastman. A maximum of 16 credits may be counted toward the B.A. degree.
5. Keyboard skills (4 credits). Students must demonstrate keyboard facility prior to graduation either by successfully completing MUR 116 and 117 or by passing the equivalent proficiency test for each course.
6. Music electives (8 credits). Credits may be chosen from any MUR course numbered 120 or higher and/or ESM course numbered 200 or higher, except ESM's MHS 421-426. Unless stated otherwise in the requirements for the track, no ensemble or private instruction credits may be included. (See the Official Bulletin: Eastman School of Music for its course offerings and credit hours.)

In accordance with University policy, no more than 20 courses or the equivalent number of credit hours from a single department may be applied toward the degree. Although the requirements for the concentration in music can be met in three years, students considering a music concentration are urged to begin the music theory sequence in the fall semester of their first year. Students with limited background in music who do not qualify for Theory I should enroll in MUR 110, Introduction to Music Theory, during their first year.

THE MINOR IN MUSIC
A total of 28 credit hours are required, with 8 of those credits specifically designated: MUR 111 and MUR 134. The remaining 20 credits are to be chosen from among MUR courses numbered 112, 120, or higher and/or ESM courses numbered 200 or higher, no more than 8 credits of which can derive from studio instruction or ensembles.

UPPER-LEVEL WRITING REQUIREMENT
The College's discipline-based writing requirement will be satisfied by successful completion of the music history sequence (MUR 221–224), which offers ample opportunity for various modes of written discourse.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

100. Experiencing Music. Explores all aspects of music, from elementary technical concepts (rhythm, melody, texture, basic forms) to factors that shape musical performance and composition, and economics and management of musical institutions. Includes in-class performances, discussions with performers, some concert attendance, and listening sessions with emphasis on development of aural skills. Prerequisite: none. (Spring)

101. Elements of Music. For the student with no previous musical experience. Topics include notation, intervals, chords, and other basic concepts of tonal harmony, with application to the study of a wide range of styles including popular idioms. Students should not be able to read music. (Fall and Spring)

103. Musical Adventures: A Trip Too Hip to Miss. Bach to Goolio—and lots of stops in between. Covers essential musical vocabulary, grammar, and musical sound production. Music of Italy, Germany, England, France, New Orleans, Chicago, and Harlem. Students may even be asked to try their hand at a little musical creation. Prerequisite: none. (Spring)

109. Musicianship I: Literacy Skills. Credit—1 hour. Extensive work with clefs, notation, intervals, and scales. Aural work through sight-singing and dictation, emphasizing melody and rhythm. Music-reading work emphasizes speed and fluency in recognizing structures in musical score. Prerequisite: prior experience in reading music notation in both treble and bass clefs. (Fall and Spring)

110. Introduction to Music Theory. Basic concepts of music theory, addressing students with some musical experience in an instrument or voice, but little or no music theory. Scales, keys, intervals, chords, basic partwriting, and other fundamental aspects of musical structure. Some ear training and aural skills. Prerequisite: ability to read music, preferably in both treble and bass clefs. (Fall and Spring)

111. Theory I. Basic elements of harmony; voice-leading, and analysis. Part-writing in chorale style teaches elementary aspects of tonal theory. The first in a four-course sequence; prospective music majors begin their theory requirement with this course. Prerequisite: MUR 101 or 110; placement test required for incoming students. (Fall)

112. Theory II. Continuation of MUR 111. Introduces chromatic harmony and modulation. Basic contrapuntal ideas such as imitation, compound melody, and sequence. More emphasis on analysis, including popular song forms. Prerequisite: MUR 111. (Spring)

113. Musicianship II. Credit—1 hour. Continuation of MUR 109. Prerequisite: MUR 109; or basic knowledge of treble and bass clefs, scales, and intervals; or placement by theory coordinator. Concurrent enrollment in MUR 11 recommended. (Fall and Spring)

114. Musicianship III. Credit—1 hour. Introduction to harmonic dictation and polyphonic sight-singing. Prerequisite: MUR 113 or permission of theory coordinator. Concurrent enrollment in MUR 112 recommended. (Fall and Spring)

115. Musicianship IV. Credit—1 hour. Continuation of MUR 114. Prerequisite: MUR 114 or permission of theory coordinator. Concurrent enrollment in MUR 211 recommended. (Fall and Spring)

116. Keyboard Skills I. Credit—2 hours. Keyboard use as a vehicle for broader musical development. Basic piano technique, sight-reading of simple chord progressions, realization of figured bass, basic improvisation. No prior keyboard training required. Prerequisite: permission of instructor. (Fall and Spring)

117. Keyboard Skills II. Credit—2 hours. Continuation of MUR 116. Completes piano proficiency for music concentrators. Prerequisite: MUR 116 or permission of instructor. (Fall and Spring)

120. Symphony and the Conductor. Detailed examination of orchestral music—its performance, history, and role of the conductor. Class lectures, observation of rehearsals, lectures by local professionals, some concert attendance. Prerequisite: MUR 111. (Spring)

121. World Musics. Theater music from China and Japan, Indian and Indonesian classical music, ritual and ceremonial music from West Africa, Eastern Europe, and the United States. Focuses on musical sound structures and social, political, and religious contexts for musical performances. Prerequisite: none.

122. History of Jazz. Lives and music of jazz musicians of instrumental, vocal, and ensemble genres. Titans such as Louis Armstrong, Miles Davis, Coleman Hawkins, Charlie Parker, and others whose contributions shaped the jazz landscape of the twentieth century. Blues, ragtime, swing, bebop, cool, progressive, and free jazz; influence of jazz on composers in European “classical” traditions. Designed for students with little or no musical training. Prerequisite: none. (Fall)

123. Music of Black Americans. Black American Christian musical beginnings including forms of worship, early musical practices, the spiritual, evolution of Gospel. Antebellum musical activities, Harlem renaissance, literary contributions of writers such as Langston Hughes and Georgia Douglas Johnson. Blues and classical music forms from late-nineteenth to mid-twentieth century, theater music from minstrelsy to Broadway, syncopated dance orchestra and brass bands, bebop. Prerequisite: none. (Spring)

126. **Opera.** Study of a small number of representative operas highlighting opera’s history, creators, performers, audiences. Examines drama, music, staging, spectacle, dance. Prerequisite: ability to read music.


133-233. **Musical Theater Workshop.** Intensive practical experience with scene-and-song work in popular musical theater repertory. Weekly rehearsals and critique sessions; emphasis on characterization, technical skills, subtextual dimensions, stylistic considerations, preparation for performance. Initial and concluding videotaping of “audition piece.” Prerequisite for MUR 133: one year of voice instruction. MUR 233 offers advanced techniques of singing and acting for the musical stage. Prerequisite for MUR 233: MUR 133 or permission of instructor.

134. **Musical Style and Genre.** Advanced introduction to historical development of Western classical music from middle-ages through the twentieth century. Considering stylistic characteristics of each period and the stages of development of Western-music genres such as the symphony, sonata, Mass, and opera. Intended for those with considerable previous musical experience. Required for the minor in music. Prerequisites: MUR 110 or 111. (Spring)

135. **Sondheim and the Modern Musical Theater.** Survey of the modern musical theater through the works of Stephen Sondheim, from *West Side Story* through *Passion*. A brief history of the American musical from *Show Boat* through the mid-fifties, then in-depth study of each of Sondheim’s major Broadway musicals. Analysis of lyrics, musical forms and idioms, process of adaptation and production. Prerequisite: ability to read music or strong background in the musical theater.

136. **Shakespeare and Music.** Musical world of Shakespeare’s day, specific uses of music within his plays and their revivals, musical representation of Shakespearean themes by later composers. Prerequisite: none.

150. **Women’s Chorus.** Credit—1 hour. Prerequisite: audition.

151. **Men’s Chorus.** Credit—1 hour. Prerequisite: audition.

152. **Chamber Singers.** Credit—1 hour. Prerequisite: audition.

153. **Symphony Orchestra.** Credit—1 hour. Prerequisite: audition.

154. **Chamber Orchestra.** Credit—1 hour. Prerequisite: audition.

155. **Chamber Ensembles.** Credit—1 hour. Prerequisite: audition.

156. **Wind Symphony.** Credit—1 hour. Prerequisite: audition.

157. **Jazz Ensemble.** Credit—1 hour. Prerequisite: audition.

158. **Gospel Ensemble.** Credit—1 hour. Prerequisite: audition.

159. **Gamelan Ensemble.** Credit—1 hour. Prerequisite: audition.

160. **Advanced Piano Study.** Weekly one-hour private lessons with artist-in-residence. Advanced students learn how to practice efficiently, develop new repertoire, improve piano skills and technique. Prerequisite: audition and permission of instructor.

161. **Broadcasting in the Digital Age.** Descriptive and critical analysis of electronic mass media, broadcast practices, and impact. Historical development of mass media institutions and role of media in society, including evaluation of news, government regulation, economics, emerging technologies, audience dynamics, decision making, organizational aspects of broadcast industry. Prerequisite: none. (Spring)

162. **Music and the Mind.** Introduction to music cognition. Topics include empirical methods, psycho-acoustic principles, influence of Gestalt psychology, music and language, metric and tonal hierarchies, music and the brain, aspects of musical development, and research on musical memory, expectation, and emotion. Prerequisite: MUR 111. (Spring)

201. **Basic Jazz Theory and Improvisation I.** Rudiments of jazz, including chord and scale spellings and relationships, jazz/pop chord symbol nomenclature, basic forms, chord substitutions, piano voicing; strong emphasis on ear training, vocalization, and transcription from records of jazz solos. Prerequisite: MUR 111 or permission of instructor. (Fall)

211. **Theory III.** Continuation of MUR 210. Focuses on analysis of larger forms, such as sonata, rondo, and song forms. Advanced study of harmonic analysis and modulation to remote keys. Prerequisite: MUR 112. (Fall)

212. **Theory IV.** Continuation of MUR 211. Explores theoretical and aesthetic principles of twentieth-century music, especially in relation to earlier compositional procedures. Introduces basic post-tonal theory, including set-class analysis, transformational theory, and serial techniques. Prerequisite: MUR 211. (Spring)

221. **History of Western Music: Early Middle Ages to High Renaissance.** Survey of Ancient, Medieval, and Renaissance periods of Western art music; introduces repertory through extensive listening, analysis, reading assignments, and group performances. Prerequisite: MUR 112. (Fall, with MUR 222 required the following spring. MUR 221 and 222 are offered every other year, alternating with MUR 223 and 224.)

222. **History of Western Music: 1600–1750.** Survey of Baroque and early Classical music. Explores little-known terrain of seventeenth-century music and fosters an informed perspective of more familiar eighteenth-century works (Bach, Handel). Prerequisite: MUR 221. (Spring)

223. **History of Western Music: 1750–1850.** Emphasis on analysis of masterpieces of tonal music and their relationship to society and the other arts. Lecture, with extensive listening and analysis, reading assignments. Prerequisite: MUR 112. (Fall, with MUR 224 required the following spring. MUR 223 and 224 are offered every other year, alternating with MUR 221 and 222.)

224. **History of Western Music: 1850–Present.** Emphasis on the changing meaning of “new music” and its role in society. Analysis of post-Wagnerian tonal music and non-tonal alternatives. Lecture, with extensive listening and reading, as well as medium-length papers. Prerequisite: MUR 223. (Spring)

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**NAVAL SCIENCE**

Steven A. Borden, Captain, USN, M.A. (U.S. Army War College)  Professor of Naval Science

Andrew E. Shuman III, Commander, USN, M.A. (U.S. Naval War College)  Associate Professor of Naval Science

John DeSantis, Lieutenant, USN, B.S. (U.S. Naval Academy)  Assistant Professor of Naval Science

Matthew Hays, Lieutenant, USN, Assistant Professor of Naval Science

Ryan Reynolds, Lieutenant, USN, Assistant Professor of Naval Science

Kevin T. Saunders, Major, USMC, JP Law (Syracuse University College of Law)  Assistant Professor of Naval Science

The Department of Naval Science does not use teaching assistants in its instructional program.

Naval science studies are designed to prepare students seeking commissions in the U.S. Navy or U.S. Marine Corps through the NROTC Program. The University has had an NROTC unit on campus since 1946. The NROTC Program is open to both male and female students. Any student may enroll in courses offered by the Department of Naval Science.

Students participate in the NROTC Program in one of three options:

1. **NROTC SCHOLARSHIP PROGRAM** students are selected by national competition. Applications may be obtained from the Department of Naval Science and must be mailed by early November for enrollment in the following fall semester. Students are subsidized by the Navy for tuition, fees, textbooks, and uniforms, and they receive a subsistence allowance during the academic year. Scholarship students...
may withdraw from the program at their own request without obligation at any time prior to the beginning of the sophomore year. Thereafter, the student is obligated to accept a commission as Ensign, USN, or Second Lieutenant, USMCR, upon graduation and to serve on active duty for a minimum of four years.

2. NROTC COLLEGE PROGRAM is available to all first- and second-year students and is specifically designed to provide an opportunity for students to earn a commission. Students are welcome to apply for the program by contacting any member of the Department of Naval Science for details. College Program students receive uniforms and a subsistence allowance during the junior and senior years. College Program students are eligible to apply for a scholarship and, if successful, become Scholarship students. College Program students incur a service obligation upon beginning their junior year. They must agree to accept a commission as Ensign, USNR, or Second Lieutenant, USMCR, upon graduation and to serve thereafter on active duty for three years.

3. TWO-YEAR COLLEGE PROGRAM students may apply for the program by submitting their applications to the Professor of Naval Science. Sophomores who have two years of study remaining (including two summers) prior to receiving a baccalaureate or higher degree are eligible to apply. Students selected for the Two-Year College Program attend the Naval Science Institute for about six weeks during July and August at the Naval Education and Training Center, Newport, Rhode Island. Tuition, room, board, travel expenses, and modest subsistence are provided. The student is then eligible to join the NROTC College Program in the fall, assuming the same obligations as other College Program students.

ELIGIBILITY FOR NROTC PROGRAMS
In general, students must be U.S. citizens between 17 and 21 years of age and be physically qualified in accordance with standards prescribed for Navy midshipmen. More detailed information can be obtained from the Department of Naval Science office.

SUMMER TRAINING CRUISES
Students in the NROTC Program participate in summer cruises of approximately six weeks’ duration as part of their training to become officers in the Navy or Marine Corps. Cruises are aboard naval ships, submarines, aircraft squadrons, and shore bases throughout the world. Four-year Scholarship students attend three such summer cruises. College Program students attend one such cruise, between the junior and senior years. Two-year Scholarship students attend one cruise. While on cruise, NROTC students receive room, board, travel expenses, and compensation equivalent to one-half ensign’s pay.

NAVAL SCIENCE STUDENTS
Any student in the University may take naval science courses. Credits for courses taken in the Department of Naval Science are determined by the college in which the student is pursuing his or her concentration. Students who are thinking about applying to an NROTC program are encouraged to enroll in a naval science course.

NROTC COURSE REQUIREMENTS
The following is the recommended sequence of naval science courses for midshipmen. Deviations from the recommended sequence are permitted; however, they must be approved by the professor of naval science.

First Year
- NAV 093. Introduction to Naval Science
- NAV 250. Sea Power and Maritime Affairs

Second Year
- NAV 265. Leadership and Management
- NAV 098. Navigation I (USN midshipmen)
- NAV 251. Evolution of Warfare (USMC midshipmen)

Third Year
- NAV 094. Naval Engineering (USN midshipmen)
- NAV 249. Naval Weapon Systems (USN midshipmen)
- NAV 099. Amphibious Operations I (USMC midshipmen)

Fourth Year
- NAV 222. Naval Operations and Seamanship (USN midshipmen)
- NAV 266. Leadership and Ethics

Courses of Instruction
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

093. Introduction to Naval Science
Credit—none. Introduction to the Navy, including customs, traditions, seamanship, officer responsibilities, and naval careers. (Fall)

094. Ship Systems I
Credit—none. Detailed study of ship characteristics and types including ship design, hydrodynamic forces, stability, compartmentation, propulsion systems, and damage control. Basic concepts, theory and design of steam, gas turbine, diesel and nuclear propulsion are introduced. (Fall)

098. Navigation I
Credit—none. Relative motion and vector analysis theory (MOBOARD), naval operations, ship behavior and characteristics in maneuvering, applied aspects of ship handling, afloat communications, and command and control. In-depth study of the theory, principles, procedures, and application of plotting, piloting, and celestial navigation. Students learn piloting techniques; use of nautical charts and publications; the use of visual, radar, and electronic aids; and theory of operation of ship’s compasses. Other topics include tides and currents, voyage planning, and the application and understanding of international rules of navigation. Naval operations are also discussed. The course is supplemented with review/analysis of navigational case studies. (Spring)

099. Amphibious Operations
Credit—none. This course analyzes a series of historical cases in an effort to discern certain patterns and principles that provide the basis for a professional understanding of amphibious warfare. This is a history-based course and not doctrine-based (although the historical development of doctrine is addressed). The object is to educate the student in the characteristics, requirements, and problems of amphibious operations. (Spring)

222. Naval Operations and Seamanship
Credit—none. This course further develops knowledge and practical skills learned in Navigation I (NAV 098). It is a general introduction to Naval Operations at sea and covers topics in four broad sections including (1) Advanced Navigation: charts, maneuvering board, formation sailing, nautical rules of the road, and international laws of the seas; (2) Communications: security, radio procedures, tactical communications, and maneuvering; (3) Evolutions and Operations: shipboard watch-standing, ship-handling, and evolutions; (4) Naval Doctrine and Joint/Combined Operations. This class prepares midshipmen for a first tour in the active surface ship fleet. (Fall)

249. Ships Systems II
This course investigates the theories and implementation of naval weapons systems. The student explores the fundamentals of target detection (using radar and sonar), warhead and fuse design, guidance and control principles, propulsion and launching, fire control, and mine warfare. Case studies are used during the course to aid the student in understanding the concepts of command, control, and communication. Current world events and historical issues are discussed as applicable. (Fall)

250. Sea Power and Maritime Affairs
A survey of all aspects of maritime affairs and the effects of sea power on national development. A discussion of historical events. (Spring)
251. Evolution of Warfare. Course provides the student with an understanding of the art, concept, and more detailed history in the evolution of warfare. Similar to the History of Amphibious Operations, it focuses on the beginning of recorded history to the present day. However, emphasis is placed on the historical and educational value while familiarizing the student with an understanding of the threads of continuity and the interrelations of political, strategic, operational, tactical, and the technical levels of war. This is a reading- and research-intensive course requiring the student to draw specific comparisons of the historical evolution of several countries, their leadership, and their warfare influence from the past, while bringing into focus the application of these same principles and concepts to the battlefields of today and the future. (Spring)

265. Leadership and Management. This course explores human nature and the underlying philosophies and principles of leadership. Application of these philosophies and principles is integrated into classroom discussions using appropriate case studies. (Fall)

266. Leadership and Ethics. This course explores the moral, ethical, and legal issues facing leaders in industry, society, and the military while reinforcing the key underlying principles of leadership. There is a heavy emphasis on case studies using a seminar format to underscore the issues. The overall objective of this course is to develop critical thinking and reasoning skills in leadership situations, particularly those that pose a moral or ethical dilemma to the individual. (Spring)

PHILOSOPHY

David Braun, Ph.D. (California, Los Angeles) Professor of Philosophy
Gregory N. Carlson, Ph.D. (Massachusetts) Professor of Linguistics, of Philosophy, and of Brain and Cognitive Sciences
Earl Conee, Ph.D. (Massachusetts) Professor of Philosophy
Randall Curren, Ph.D. (Pittsburgh) Professor of Philosophy and of Education; Chair of the Department
Richard Feldman, Ph.D. (Massachusetts) Professor of Philosophy
Robert Lawrence Holmes, Ph.D. (Michigan) Professor of Philosophy
Henry E. Kyburg, Jr., Ph.D. (Columbia) Gideon Webster Burbank Professor of Moral and Intellectual Philosophy and Professor of Computer Science
Ralf Merzbote, Ph.D. (Harvard) Professor of Philosophy
Deborah Modrak, Ph.D. (Chicago) Professor of Philosophy
Brad Weslake, Ph.D. (Sydney) Assistant Professor of Philosophy

Edward Wierenga, Ph.D. (Massachusetts) Professor of Religion and of Philosophy
Richard Dees, Ph.D. (Michigan) Associate Professor of Neurology, of Philosophy, of Pediatrics, and of Medical Humanities
Alyssa Nye, Ph.D. (Brown) Assistant Professor of Philosophy
John Gates Bennett, Ph.D. (Michigan) Senior Lecturer in Philosophy
Rolf A. Eberle, Ph.D. (California, Los Angeles) Professor Emeritus of Philosophy
Dennis O’Brien, Ph.D. (Chicago) Professor Emeritus of Philosophy

The Department of Philosophy uses approximately eight teaching assistants in large lecture courses as graders or section leaders.

The Department of Philosophy offers programs leading to the B.A., M.A., and Ph.D. degrees. The philosophers who are members of the Department of Philosophy have a variety of specialties in philosophy and represent diverse philosophical perspectives. Philosophical issues addressed in undergraduate courses include both traditional topics from areas such as epistemology, ethics, metaphysics, political philosophy, and the philosophy of science, and also the most recent contemporary concerns. The techniques brought to bear on these issues are analytical, formal, and historical. The undergraduate program stresses Western philosophy, ancient and modern, and gives particular emphasis to recent and contemporary Anglo-American philosophy. The department’s course offerings provide an excellent foundation for graduate work in law and cognitive science, as well as in philosophy itself. A concentration in philosophy is also a valuable asset when combined with a concentration in political science, economics, or natural sciences such as biology, chemistry, geology, physics, and psychology.

The concentration requirements are designed to assure that students completing the program are familiar with the central texts in the history of philosophy as well as a variety of issues in contemporary philosophy. The department offers a general concentration in philosophy, as well as three specialized programs. One, the philosophy concentration with emphasis on law and ethics, is designed primarily for prelaw students and others who are interested in an extensive investigation of the nature of law, value, and social justice. The second special concentration emphasizes history and is designed for students with both scholarly and philosophical interests in the history of philosophy. The third special concentration emphasizes logic and the philosophy of science. It is designed primarily for students interested in one or more of the sciences who wish to pursue in depth the study of logic and the philosophy of science.

Philosophy majors must enroll in the seminar for majors (PHL 300) and one advanced in philosophy designated by a W to indicate upper-level writing credit. The W designation is available with the permission of the instructor. Both courses provide significant experience in writing through the assignment of a series of short papers, the discussion of philosophical writing, and guidance in the revision and rewriting of papers.

Undergraduates who wish to take advantage of the University’s graduate offerings in philosophy may, with permission of the instructor and approval of the undergraduate advisor, take graduate seminars (see Official Bulletin: Graduate Studies, www.rochester.edu/GradBulletin).

The department sponsors a variety of internships that combine real-world experience with philosophical inquiry. Teaching interns in the Rochester City School District work with elementary school children on reading, writing, and critical thinking skills. Internships with the Ghandi Institute for Nonviolence provide students with a variety of opportunities to participate in the Institute’s local, national, and international projects.

In the honors program in philosophy, qualifying majors work closely with a faculty member over an extended period of time. Honors students develop a research project over a one- to two-year period, and complete a graduate seminar or undergraduate seminar approved for honors credit. In addition to graduating with honors, this provides an invaluable experience in philosophical research and writing.

1. To qualify: Admission to the honors program is limited to those students who have at least an A– average (3.7 GPA) in their philosophy courses and show promise of being able to complete an honors thesis.

2. To apply: Interested students should contact the departmental undergraduate advisor to confirm that they qualify and to find a faculty advisor. This can be done in one of two ways: (a) talk to a faculty member they would like to work with, and settle upon a mutually agreeable topic; (b) if they know the topic they want to work on, ask around until they find a faculty member who is interested in supervising work on that topic.

3. Honors requirements:
   a. 4 credit hours of Honors Tutorial (PHL 392), ideally taken as two 2-credit courses during the junior year. This tutorial is devoted to reading in preparation for writing an honors thesis.
   b. 4 credit hours of Honors Thesis (PHL 393), ideally taken as two 2-credit courses during the senior year. The thesis must be finished and submitted by April 1, and defended orally by the last day of classes. The examining committee consists of the honors advisor, the department undergraduate advisor, and a third faculty member. All three members must approve the thesis before an oral examination can be scheduled.
   c. 4 credit hours of a graduate seminar (500 level) or an undergraduate seminar (300
level) approved for honors credit, taken during the junior or senior year. If an undergraduate seminar is to be used to meet this requirement, the instructor must be notified of this in advance so that arrangements can be made for any additional work that the instructor deems necessary to approximate a graduate-level experience.

d. To receive honors the student must satisfy these requirements (a–c) with an A– average. In computing this the thesis will be given the most weight (40 percent), and the tutorial and seminar somewhat less (30 percent each).

The bachelor’s degree with distinction is offered on recommendation of the department and is based primarily on the grade-point average in philosophy. Performance in undergraduate seminars and in independent study is sometimes considered.

Philosophy is relevant to every program and concentration in the University. The basic problems it addresses are of perennial significance. Below are listed groups of courses that might be of particular relevance to students concentrating in other disciplines:

anthropology
PHL 102, 103, 105, 201, 202, 247, 252
biology, chemistry, geology, microbiology, physics and astronomy
PHL 110, 152, 252
computer science, mathematics
PHL 110, 210–219, 252
economics
PHL 102, 105, 110, 220, 223, 252
English, art and art history, modern languages and cultures
PHL 115, 141, 171, 201, 202, 247
history
PHL 201–202, 260–269
naval science
PHL 102, 110, 223, 252, 308
political science
PHL 102, 105, 110, 220–229, 252, 308
psychology and cognitive science
PHL 241–249, 348
religion
PHL 101–103, 111, 201, 202, 242, 268

**REQUIREMENTS FOR CONCENTRATION IN PHILOSOPHY**

A total of 10 courses:

1. **PHILOSOPHY OF SCIENCE**
   - LAW AND ETHICS
   - MINORS IN PHILOSOPHY

**PHILOSOPHY OF SCIENCE**

A total of 10 courses:

1. PHL 110, 201, 202, 300
2. Six additional courses, meeting the following conditions:
   a. At least three of the courses must be advanced courses in philosophy. Advanced courses are those numbered above PHL 202.
   b. At least four of the courses must be in law, ethics, or reasoning (PHL 102–106, 116, 118, 220–229, 308, 311).
   c. At least one of the courses must be selected from either Logic or Related Courses (PHL 211–219), or Traditional Philosophical Disciplines (PHL 240–249), or Philosophy of Science (PHL 250–259).
   d. At least one of the courses must be an advanced philosophy course designated with a “W” to indicate upper-level writing credit. These courses are available with the permission of the instructor.

**PHILOSOPHY CONCENTRATION WITH EMPHASIS ON LAW AND ETHICS**

A total of 10 courses:

1. PHL 110, 201, 202, 300
2. Six additional courses, meeting the following conditions:
   a. At least three of the courses must be advanced courses in philosophy. Advanced courses are those numbered above PHL 202.
   b. At least four of the courses must be in law, ethics, or reasoning (PHL 102–106, 116, 118, 220–229, 308, 311).
   c. At least three of the courses must be selected from either Logic or Related Courses (PHL 211–219), or Traditional Philosophical Disciplines (PHL 240–249), or Philosophy of Science (PHL 250–259).
   d. At least one of the courses must be an advanced philosophy course designated with a “W” to indicate upper-level writing credit. These courses are available with the permission of the instructor.

3. An advanced course in an allied field may be substituted for a philosophy course in requirement 2 above, with the permission of the philosophy department’s undergraduate advisor.

**PHILOSOPHY CONCENTRATION WITH EMPHASIS ON HISTORY**

A total of 10 courses:

1. PHL 110, 201, 202, 300
2. Six additional courses, meeting the following conditions:
   a. At least three of the courses must be advanced courses in philosophy. Advanced courses are those numbered above PHL 202.
   b. At least one of the courses must be in ethics (PHL 102, 103, 116, 118, 220–229, 308, 311).
   c. At least one of the courses must be selected from either Logic or Related Courses (PHL 211–219), or Traditional Philosophical Disciplines (PHL 240–249), or Philosophy of Science (PHL 250–259).

3. An advanced course in an allied field may be substituted for a philosophy course in requirement 2 above, with the permission of the philosophy department’s undergraduate advisor.

**MINORS IN PHILOSOPHY**

Each minor requires five courses. These should be chosen in consultation with the undergraduate advisor, but need not have a specific focus.

**Plan A**

PHILOSOPHY OF SCIENCE
PHL 110, 252, and three other courses in philosophy of science (PHL 105, 106, 218, 243, 244, 253, 352, 391).

**Plan B**

ETHICS
PHL 102 and four other courses in ethics and related areas (PHL 103, 116, 118, 220–229, 308, 311).

**Plan C**

HISTORY OF PHILOSOPHY
PHL 201 and 202 and three other courses in the history of philosophy (PHL 260–269, 315, 319, 320, 325, 370).
Plan D
PHILOSOPHY
Five courses in philosophy, chosen in consultation with the undergraduate advisor.

CLUSTERS
The department offers six clusters:
- Ethics and Values
- History of Philosophy
- Knowledge, Mind, and Nature
- Philosophy and Law
- Philosophy Teaching Internship
- Logic

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

INTRODUCTORY COURSES
101. Introduction to Philosophy. A study of fundamental philosophical problems and approaches to their solution.
102. Ethics. A critical examination of leading theories of right and wrong, and good and evil.
103. Contemporary Moral Problems. The application of ethical theory to moral problems, such as punishment, abortion, and racism.
105. Reason and Argument. A study of reason and argument on both scientific and non-scientific topics. How to evaluate reasoning as it is found in editorials, speeches, and essays. How to understand and evaluate the reasoning found in reports on scientific research.
108. Philosophy of War. An examination of the concepts of war, legal and moral aspects of just war theory, pacifism, and the problem of war and moral responsibility.
110. Introductory Logic. Precise methods for formalizing arguments, demonstrating their validity, and proving theorems in first-order symbolic logic. Same as COG 110.
111. Introduction to Religion. Same as REL 161.
118. Business Ethics. A study of the applications of general moral theory to some of the more important moral problems arising in the areas of business and management.
141. Aesthetics. Critical examination of some of the major problems in aesthetics and consideration of the historical routes along which they have evolved. Same as AH 269.
145. Minds and Machines. A study of the nature of the mind and artificial intelligence.
152. Science and Reason. An introduction to basic questions which arise when one reflects on the nature of science and its development.
171. Philosophical Foundations of Feminism. The investigation of some of the philosophical issues raised by contemporary feminism, such as questions about justice, human nature, and human freedom. Same as WST 205.

HISTORICAL COURSES
201. History of Ancient Philosophy. Lecture survey of the development of Western philosophy from the prephilosophical beginnings through Aristotle. (Fall)
202. History of Modern Philosophy. A study of important philosophers from the seventeenth to the eighteenth century, and of their position in the cultural history of the West. (Spring)
265. Selected Topics in Ancient Philosophy. Foundations of Ancient Greek philosophy from pre-Socratic to Hellenistic philosophers. Prerequisite: PHL 201 or permission of instructor.
266. Rationalism. A study of Descartes, Leibniz, and Spinoza, with emphasis on the last. Topics include the nature of substance, of space and time, and of knowledge and mind. Prerequisite: PHL 202.
268. Augustine, Anselm, and Aquinas. Same as REL 230.

LOGIC AND RELATED COURSES
214. Logical Methods in Philosophy. Philosophical logic: modal, tense, many-valued logic, logical linguistics, mereology, etc. Prerequisite: PHL 110 or permission of instructor.
216. Mathematical Logic. Same as MTH 216 and CSC 216. Prerequisite: PHL 110 or permission of the instructor.
217. Uncertain Inference. The exploration of various measures of uncertainty proposed in philosophy and computer science. Prerequisite: PHL 110 or permission of instructor. Same as COG 217 and CSC 217.
218. The Philosophy of Mathematics. A study of the nature of mathematics from a philosophical point of view. Prerequisite: PHL 110 or permission of the instructor.
219. Deviant Logic. This course is concerned with the study of “alternative” logics: logics in which more than two truth values are possible, logics in which not every statement has a truth value, logics that are designed to accommodate vagueness, logics that allow inconsistencies. Prerequisite: PHL 110 or PHL 210 or permission of the instructor.

ETHICS AND RELATED COURSES
220. Recent Ethical Theory. An examination of the main twentieth-century ethical and meta-ethical theories. Readings from Moore, Ross, Stevenson, Hare, et al. Prerequisite: PHL 102 or permission of the instructor.
221. Philosophical Foundations of American Revolution. A study of the philosophical foundations of the American Revolution by examining the political theory which lies behind the revolution and which underlies the foundations of the Constitution.
223. Social and Political Philosophy. An inquiry into the nature of human society, role of the state, and relation of moral to legal obligation. Prerequisite: PHL 102 or permission of the instructor.
224. History of Ethics. An examination of the major writers on ethics in Western thought, including Plato, Aristotle, Aurelius, Augustine, Hume, Kant, Mill, and Nietzsche. Prerequisite: one previous course in philosophy.
225. Ethical Decisions in Medicine. An examination of some of the troubling ethical issues associated with medicine, including the medical circumstances of conception and birth, medical enhancement of mental and physical abilities, and end-of-life issues.
226. Philosophy of Law. The nature of law and legal practice in relation to ethics. Prerequisite: one previous course in philosophy.
230. Environmental Justice. Considers environmental problems and the distribution of environmental resources and burdens from the standpoint of ethics and political philosophy. Prerequisite: one previous course in philosophy.

TRADITIONAL PHILOSOPHICAL DISCIPLINES
242. Metaphysics. The study of the nature of a person, the relations of mind and matter, and the existence of God. Prerequisite: one previous course in philosophy.
244. Philosophy of Mind. A discussion of problems connected with the nature of mind, e.g., the mind/body problem and the problem of personal identity. Prerequisite: one previous course in philosophy.
247. Philosophy of Language. A study of philosophical questions about language and the general nature of language. Prerequisite: one previous course in philosophy.

PHILOSOPHY OF SCIENCE
252. Philosophy of Science. Examines the nature of scientific theories, theory confirmation, laws, explanation, and related topics. Prerequisite: PHL 110 or permission of instructor.

SEMINARS
300. Seminar for Majors. Restrictions: open only to philosophy majors and minors.
308. Morality and War. An examination of the question whether war can be morally justified, with special attention to the just war theory, the killing of innocents, and nuclear deterrence. Prerequisite: one previous course in philosophy.
324. **Rousseau to Revolution.** A study of the political philosophy of Rousseau and the French Revolution. Prerequisite: one previous course in philosophy.

342. **Metaphysics.** A close examination of one or more topics from recent work in metaphysics, such as identity, essential properties, universals, possible worlds, and free will. Prerequisite: one previous course in philosophy.

343. **Free Will.** An investigation of recent proposed answers to the classical philosophical issues concerning free will. Prerequisite: one previous course in philosophy.

360. **Selected Topics in the Philosophy of Religion.** An examination of recent work in the philosophy of religion. Prerequisite: one previous course in philosophy.

391. **Independent Study in Philosophy.** The reading of philosophical literature under guidance, for seniors majoring in philosophy.

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**PHYSICS AND ASTRONOMY**

Govind P. Agrawal, Ph.D. (Indian Institute of Technology, New Delhi) **Professor of Optics and of Physics** and Senior Scientist in the Laboratory for Laser Energetics.

Riccardo Betti, Ph.D. (M.I.T.) **Professor of Mechanical Engineering and of Physics and Senior Scientist in the Laboratory for Laser Energetics.**

Nicholas P. Bigelow, Ph.D. (Cornell) Lee A. DuBridge **Professor of Physics, Professor of Optics, and Senior Scientist in the Laboratory for Laser Energetics.**

Eric G. Blackman, Ph.D. (Harvard) **Professor of Physics and Astronomy and Senior Scientist in the Laboratory for Laser Energetics.**

Mark F. Bocko, Ph.D. (Rochester) **Professor of Electrical and Computer Engineering and of Physics.**

Arie Bodek, Ph.D. (M.I.T.) **George E. Pake Professor of Physics and Professor of Physics.**

Robert Boyd, Ph.D. (California, Berkeley) **M. Parker Giervis Professor of Optics and Professor of Physics.**

Douglas Cline, Ph.D. (Manchester) **Professor of Physics.**

Esther Connell, Ph.D. (Chicago) **Professor (Research) of Chemistry and of Physics.**

Ashok Das, Ph.D. (SUNY, Stony Brook) **Professor of Physics.**

Regina Demina, Ph.D. (Northeastern) **Professor of Physics.**

David H. Douglass, Jr., Ph.D. (M.I.T.) **Professor of Physics.**

Joseph H. Eberly, Ph.D. (Stanford) **Andrew Carnegie Professor of Physics and Professor of Optics.**

Thomas Ferbel, Ph.D. (Yale) **Professor of Physics.**

William J. Forrest, Ph.D. (California, San Diego) **Professor of Astronomy; Director, C.E. Kennett Mees Observatory.**

Thomas H. Foster, Ph.D. (Rochester) **Professor of Imaging Sciences, of Optics, and of Physics.**

Adam A. Frank, Ph.D. (Washington, Seattle) **Professor of Physics and Astronomy and Scientist in the Laboratory for Laser Energetics.**

Yongli Gao, Ph.D. (Purdue) **Professor of Physics.**

Carl Richard Hagen, Ph.D. (M.I.T.) **Professor of Physics.**

Robert L. McCrory, Ph.D. (M.I.T.) **Professor of Mechanical Engineering and of Physics and Senior Scientist in the Laboratory for Laser Energetics.**

Luke Norton, Jr., Sc. Techn. (Swiss Federal Institute of Technology) **Professor of Optics, and of Biomedical Engineering, and Scientist in the Laboratory for Laser Energetics.**

Lyne Orr, Ph.D. (Chicago) **Professor of Physics.**

Adrian C. Mellisinos, Ph.D. (M.I.T.) **Professor of Physics.**

David D. Meyerhofer, Ph.D. (Princeton) **Professor of Mechanical Engineering and of Physics and Senior Scientist in the Laboratory for Laser Energetics.**

Lukas Novotny, Dr. Sc. Techn. (Swiss Federal Institute of Technology) **Professor of Optics, and of Biomedical Engineering, and Scientist in the Laboratory for Laser Energetics.**

Lyne Orr, Ph.D. (Chicago) **Professor of Physics.**

Sara C. Rajeve, Ph.D. (Syracuse) **Professor of Physics.**

Lewis Rothberg, Ph.D. (Harvard) **Professor of Chemistry, of Chemical Engineering and of Physics.**

Wolf-Udo Schröder, Ph.D. (Darmstadt) **Professor of Chemistry and of Physics.**

Jonathan Shapir, Ph.D. (Tel Aviv) **Professor of Physics and of Chemical Engineering.**

Paul Slattery, Ph.D. (Yale) **Professor of Physics; Dean of Research.**

Roman Sobolewski, Ph.D. (Polish Academy of Sciences) **Professor of Electrical and Computer Engineering and of Physics.**

Carlos R. Stroud, Jr., Ph.D. (Washington, St. Louis) **Professor of Optics and of Physics.**

John A. Tarduno, Ph.D. (Stanford) **Professor of Geophysics and of Physics.**

Stephen L. Teitel, Ph.D. (Cornell) **Professor of Physics.**

John H. Thomas, Ph.D. (Purdue) **Professor of Mechanical and Aerospace Sciences and of Astronomy.**

Edward H.Thorndike, Ph.D. (Harvard) **Professor of Physics.**

Dan M. Watson, Ph.D. (California, Berkeley) **Professor of Physics and Astronomy.**

Emil Wolf, Ph.D. (Bristol), D.Sc. (Edinburgh) **Wilson Professor of Optical Physics and Professor of Physics.**

Frank L. H. Wolfs, Ph.D. (Chicago) **Professor of Physics.**

Jianhui Zhong, Ph.D. (Brown) **Professor of Imaging Sciences, of Biomedical Engineering, and of Physics.**

Steven Manly, Ph.D. (Columbia) **Associate Professor of Physics.**

Alice Quillen, Ph.D. (California Institute of Technology) **Associate Professor of Physics and Astronomy.**

John C. Howell, Ph.D. (Pennsylvania State) **Assistant Professor of Physics and Astronomy.**

Andrew Jordan, Ph.D. (California, Santa Barbara) **Assistant Professor of Physics.**

Chuang Ren, Ph.D. (Wisconsin-Madison) **Assistant Professor of Mechanical Engineering and of Physics.**

Theodore Castner, Ph.D. (Illinois) **Professor Emeritus of Physics.**

Harry W. Fulbright, Ph.D. (Washington) **Professor Emeritus of Physics.**

Harry E. Gove, Ph.D. (M.I.T.) **Professor Emeritus of Physics.**

H. Lawrence Helfer, Ph.D. (Chicago) **Professor Emeritus of Astronomy.**

John Huizenga, Ph.D. (Illinois) **Tracy H. Harris Professor Emeritus of Chemistry and Professor Emeritus of Physics.**

Edward H. Jacobsen, Ph.D. (M.I.T.) **Professor Emeritus of Physics.**

Robert S. Knox, Ph.D. (Rochester) **Professor Emeritus of Physics and Senior Scientist in the Laboratory for Laser Energetics.**

Daniel S. Koltun, Ph.D. (Princeton) **Professor Emeritus of Physics and Senior Scientist in the Laboratory for Laser Energetics.**

Susumu Okubo, Ph.D. (Rochester) **Professor Emeritus of Physics.**

Judith L. Pipher, Ph.D. (Cornell) **Professor Emeritus of Astronomy.**

Malcolm P. Savedoff, Ph.D. (Princeton) **Professor Emeritus of Astronomy.**

Stewart Sharpless, Ph.D. (Chicago) **Professor Emeritus of Astronomy.**

Albert Simon, Ph.D. (Rochester) **Professor Emeritus of Mechanical Engineering and of Physics and Senior Scientist in the Laboratory for Laser Energetics.**

Robert L. Sproull, Ph.D. (Cornell) **Professor Emeritus of Physics.**

Hugh Van Horn, Ph.D. (Cornell) **Professor Emeritus of Physics and Astronomy.**

Approximately 25 graduate teaching fellows and several carefully selected undergraduates assist the faculty in the presentation of the teaching program.

The Department of Physics and Astronomy provides a spectrum of opportunities for undergraduates, ranging from introductory courses for the nonscientist to a minor in physics or astronomy and complete degree programs leading to the B.A. and B.S. in physics or astronomy (astrophysics). The graduate program offers advanced courses that are open to undergraduates seeking in-depth study.

In accord with College policy, students are not formally accepted as concentrators until the end of their sophomore year. However, first-
second-year students wishing to major in physics or in physics and astronomy should alert the department’s Office of Undergraduate Studies, to be assigned a departmental advisor.

The department awards several prizes in recognition of special achievement. The Honors Physics Prize is presented annually to the student with the best record in PHY 142, 143, and 237. The Stoddard Prize is awarded for the best senior thesis. The Fulbright Prize is awarded for the best performance in Advanced Laboratory. The John F. Flagg Award is given annually to the graduating senior who has compiled the best academic record in undergraduate courses. A complete description of the requirements for these prizes is available at the department’s Office of Undergraduate Studies, 211 Bausch & Lomb Hall.

GENERAL COURSE INFORMATION
Of particular interest to students not concentrating in the natural sciences are PHY 100, 103, 105, AST 102, 104, and 105. These provide either broad surveys or are focused on selected topics, but do not require any special background. Students with interest in science and music will find PHY 103 highly appropriate. For those desiring a working knowledge of basic physics, PHY 113–114 or 121, 122, and 123 are appropriate. The latter requiring a background in high school science and mathematics, as does AST 111, on the solar system. AST 142, a survey of astrophysics, is designed for the physical science major with background in general physics. The sequence PHY 141, 142, and 143 is recommended for all students with interest and abilities in physics, and is most appropriate for those wishing to major in the department. A student who does well in the PHY 121, 122, 123 sequence should be equally well prepared to pursue one of the department’s degree programs.

Based on scores on the Advanced Placement Test, or the equivalent (and an interview), students can enter the department degree programs with advanced standing.

CONCENTRATION IN PHYSICS
The B.A. program is appropriate for students desiring a broad academic experience. It also provides greater flexibility when planning a joint degree with another department. The B.S. degree in physics is intensive and provides stronger preparation for graduate school in physics or a closely related science. Students planning to pursue graduate study normally elect the B.S. program; they are strongly encouraged to take advantage of opportunities for independent reading or research provided by PHY 391, 393, and 395.

GENERAL REQUIREMENTS
Preparation for concentration in physics is similar for students interested either in B.A. or B.S. degrees:

- PHY 121 or 141 (Honors), 122 or 142 (Honors), and 123 or 143 (Honors).
- Four semesters of mathematics: MTH 161, 162, 164, 165 (or their close equivalents).

- For the B.S. program, one introductory course in the natural sciences, other than in physics or mathematics. This should be completed within the first two years.

The B.A. and B.S. programs of study should be planned by the student in consultation with the departmental advisor before the end of the sophomore year, and require departmental approval.

B.A. PROGRAM (PHYSICS)
Requirements beyond the first two years

- PHY 217, 235W, 237; one additional course chosen from among the following: PHY 218, 227, 243W, 246.
- An additional 4 credit hours of approved 200- or 300-level physics and/or astronomy courses.
- Eight additional credit hours (usually two 4-credit hour courses), which can be approved 200- or 300-level physics and/or astronomy courses, 200-level mathematics courses, or other science or engineering courses (not necessarily at the 200 level). Because MTH 281 and/or 282 is required for many of the 200-level physics courses, the options are more restrictive than they seem.
- All course choices must be approved by the undergraduate physics advisor.

B.S. PROGRAM (PHYSICS)
Requirements beyond the first two years

- PHY 217, 218, 227, 235W, 237, 246 (or their close equivalents); PHY 243W or 244W; an additional 4 credit hours of approved 200- or 300-level physics and/or astronomy courses.
- Two advanced courses in mathematics (MTH 281 is required; MTH 282 is recommended).
- Computer literacy. This requirement can be satisfied by receiving a passing grade in an introductory computing course or in PHY 256 (Computational Physics), by completing a computer-based problem approved by the department’s undergraduate advisor (possibly one associated with a previous class), or by having a faculty member familiar with the students’ work certify the computer literacy.
- All course choices must be approved by the undergraduate physics advisor.

Students with a prior knowledge of differential and integral calculus should take PHY 141 and 143 in their freshman year and PHY 142 in their sophomore year; others should take PHY 121 in the spring of their freshman year and PHY 122 and 123 in their sophomore year. A synopsis of a typical honors program for the B.S. in physics follows:

**First Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 141</td>
<td></td>
</tr>
<tr>
<td>MTH 161</td>
<td></td>
</tr>
<tr>
<td>CAS 105</td>
<td>Elective</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

**Second Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 142</td>
<td></td>
</tr>
<tr>
<td>MTH 164</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

**Third Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 217</td>
<td></td>
</tr>
<tr>
<td>PHY 235W</td>
<td>MTH 227</td>
</tr>
<tr>
<td>MTH 281</td>
<td>MTH 282</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

**Fourth Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>PHY 243W</td>
<td></td>
</tr>
<tr>
<td>PHY or AST elective</td>
<td>PHY or AST elective</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective</td>
</tr>
</tbody>
</table>

REQUIREMENTS FOR A MINOR IN PHYSICS

- An introductory physics sequence: PHY 121 or 141 (Honors), 122 or 142 (Honors), and 123 or 143 (Honors).
- Any three of the following courses: PHY 217, 218, 227, 235W, 237, 243W, 244W, 245W, 246, 250, 251, 252, 253, 254, and 256.
- All course choices must be approved by the undergraduate physics advisor. The advisor will be concerned with the general coherence of the program, the student’s plans to take any prerequisites, and mutual reinforcements between the minor and the student’s major studies.

For admission to the minor, a student must have attained a C average in both the introductory physics sequence and the introductory mathematics courses that are prerequisites for the introductory physics courses.

CONCENTRATION IN PHYSICS AND ASTRONOMY (ASTROPHYSICS)
The programs leading to the B.A. and B.S. degrees in astrophysics, or as it is termed formally, physics and astronomy, are effectively double degree programs, and are generally similar to the corresponding programs in physics. Students planning to pursue graduate study should elect the B.S. program; they are encouraged to take advantage of opportunities for reading or research provided by AST 391 and 393 in the senior year. The program as described below can be modified to fulfill the student’s academic goals.

Approval from the astronomy advisor is required for all proposed programs. (The 200-level astronomy courses are offered in a two-year cycle.)

GENERAL REQUIREMENTS (PHYSICS AND ASTRONOMY—ASTROPHYSICS)
Requirements for the first two years are the same as those for the B.A. and B.S. in physics, except that AST 111 and 142 are normally taken in place of the electives in the first two years.

Background knowledge equivalent to that contained in AST 111 and 142 is needed for completion of the degrees (AST 142 is recommended).
B.A. PROGRAM  
(PHYSICS AND ASTRONOMY—ASTROPHYSICS)  
Requirements beyond the first two years  
• Two of the following: AST 203, 232, 241, or 242, including at least one of AST 241 or 242.  
• Three additional 200-level physics or astronomy courses. Two of the three courses must be selected from the following list: PHY 217, 227, 235W, 237.  
• Two additional 200-level technical courses, which can be in physics, mathematics, or another science or engineering. Some engineering courses at the 100-level may also be acceptable, with prior approval from the undergraduate astronomy advisor.  
• At least a 2.0 (C) average in astronomy, physics, and mathematics courses must be maintained.  
• All course choices must be approved by the undergraduate astronomy advisor.

B.S. PROGRAM  
(PHYSICS AND ASTRONOMY—ASTROPHYSICS)  
Requirements beyond the first two years  
• Three of the following: AST 203W, 232W, AST 241, or AST 242.  
• A total of six courses in physics at the 200 level or beyond: PHY 217, 218, 227, 235W, 237, 243W, 246, 250 (or close equivalents), or AST 393W (Senior Thesis). PHY 218 and 243W are recommended.  
• Two courses in advanced mathematics: MTH 281 and 282 are recommended.  
• All course choices must be approved by the undergraduate astronomy advisor.  

Students with a prior knowledge of differential and integral calculus should take PHY 141 and 143 in their freshman year and PHY 142 in their sophomore year; others should take PHY 121 in the spring of their freshman year and PHY 122 and 123 in their sophomore year. A synopsis of a typical honors program for the B.S. in physics and astronomy follows:

First Year  
PHY 141  
MTH 161  
CAS 105  
AST 111  
PHY 143  
MTH 162  
Elective  
Elective

Second Year  
PHY 142  
MTH 164  
Elective  
Elective  
PHY 237  
MTH 165  
AST 142  
AST 142

Third Year  
PHY 217  
PHY 235W  
MTH 281  
AST 232  
PHY 218  
PHY 227  
MTH 282  
AST 241

Fourth Year  
PHY 243W  
AST 393W  
AST 203  
Elective  
PHY 246  
AST 242  
Elective

Requirements for a Minor in Astronomy  
• An introductory physics sequence: PHY 121 or 141 (Honors), 122 or 142 (Honors), and 123 or 143 (Honors).  
• One of three descriptive astronomy courses: AST 102, 104, 105, or 111; AST 111 is preferred.  
• The introductory astrophysics course: AST 142.  
• Two 200-level astronomy courses. (Four of these are offered on a two-year cycle. These courses usually require concurrent or prerequisite registration in 200-level mathematics and physics courses.)  
• All course choices must be approved by the undergraduate astronomy advisor.

For admission to the minor, a student must have attained a C+ average in the introductory 100-level astronomy courses, and a C average in the introductory physics and mathematics courses.

Concentrators in physics can minor in astronomy.

Requirements for a Certificate in Biological or Medical Physics  
In order to be eligible for a Certificate in Biological or Medical Physics, a student must be approved by the Certificate committee and obtain at least a C+ in each of the following seven courses:

PHY 235 and 237 and one of the following courses: PHY 217, 262, or 227  
One of following courses: MTH 281 or 282  
One of following courses: BIO 110, 111, or 198  
One of following courses: CHM 131, 132, 171Q, 232, or 252  
One advanced course in biological/medical physics, e.g., PHY 252

Requirements for a Citation for Achievement in College Leadership  
The Department of Physics and Astronomy courses for this program are listed below. More information may be found on page 18 of this bulletin.  
• PHY 386—Teaching Internship I, Pedagogy Training and a workshop leader for one of the following courses: PHY 113, 122, 141, or 142.  
• PHY 387—Teaching Internship II, Pedagogy and Group Leadership and a workshop leader for one of the following courses: PHY 114, 121, 123, 143.  
• PHY 390A—Supervised Teaching with Leadership Focus and a workshop leader from one of the courses listed above as long as not a repeat. Prerequisites: PHY 386 and 387.

Requirements for a B.S.-M.S. Program in Physics, Physics and Astronomy, and Medical Physics  
Physics and astronomy students who wish to go beyond the bachelor's level may enroll in the department’s five-year general B.A./B.S. option in physics with an M.S. in any subfield physics program. The department offers another 3-2 program option, by special arrangement, for those students interested in biological/medical physics. Students are encouraged to apply to a 3-2 program in the spring of the junior year and can begin graduate-level work in the fourth year. The B.S. is ordinarily completed by the end of the fourth year, and requirements for the M.S. are completed by the end of the fifth year. The M.S. degree may be pursued via plan A (with master’s thesis) or plan B (with comprehensive exam). Some financial assistance may be available during the fifth year. Further details and program requirements can be obtained from the department’s Office of Graduate Studies.

Upper-Level Writing Requirement  
Students must fulfill the upper-level writing requirement and can do so by taking two upper-level writing courses within the department. In particular, AST 203W, 232W, PHY 235W, 243W, 244W, and 391W, 393W, 395W, in both physics and astronomy can be used for such purpose. This issue should be discussed with the undergraduate advisor.

Courses of Instruction  
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

Physics  
100. The Nature of the Physical World. This is an introductory course designed especially for students in the humanities and other nonscientific fields who are interested in learning something about the physical world in perspective. Topics include the scale of the universe from galaxies to atoms and quarks; the fundamental forces of nature, motion and relativity, energy, electromagnetism and its everyday applications; the structure of matter, atoms, light, and quantum mechanics. There are no prerequisites, no background knowledge is required, and the material is presented essentially without mathematics. Substantial use is made of demonstrations and movies. (Fall and Spring)  
103. Physics of Music. A study of the physical basis of musical phenomena. Theories of musical instruments, room acoustics, and special topics selected by the class and instructor. Two lectures and one lab per week. Half of labs devoted to individual student projects, often involving analysis of student instruments or of room acoustics. The design of this course is open to any student with a strong interest in both science and music. (Fall)
113. General Physics I. First semester of a two-course sequence suitable for students in the life sciences. Newtonian particle mechanics: Newton’s laws and their applications to straight-line and circular motion; energy, linear momentum; angular momentum; harmonic motion, Kepler’s laws; planetary and satellite motion. Calculus used and introduced as needed. In addition to two 75-minute lectures each week, one workshop each week and one three-hour laboratory every other week are required. Students are required to register for a laboratory and workshop/recitation section at the time of course registration. Workshop/recitation times are determined by the instructor. Prerequisite: MTH 141 or 161 (may be taken concurrently). (Fall and Summer I)

114. General Physics II. Second semester of a two-course sequence suitable for students in the life sciences. Electricity and magnetism, optics, electromagnetic waves, and modern physics (introduction to relativity, quantum physics, etc.). In addition to two 75-minute lectures each week, one workshop each week and one three-hour laboratory every other week are required. Students are required to register for a laboratory and workshop/recitation section at the time of course registration. Workshop/recitation times are determined by the instructor. Prerequisite: PHY 141. (Spring)

121. Mechanics. First semester of a three-course sequence for students intending to major in physics, other physical sciences, and engineering. Motion in one and two dimensions, Newton’s laws, work and energy, conservation of energy, systems of particles, rotations, oscillations, gravity, thermodynamics. In addition to two 75-minute lectures each week, one workshop each week and one three-hour laboratory every other week are required. Students are required to register for a laboratory and workshop/recitation section at the time of course registration. Prerequisite: MTH 141 or 161 (may be taken concurrently); prior knowledge of introductory calculus (simple integration and differentiation). (Spring)

122. Electricity and Magnetism. Second semester of a three-course sequence for students intending to major in physics, other physical sciences, and engineering. Coulomb’s Law, through Maxwell’s equations, electrostatics, electrical potential, capacitors, electric fields in matter, current and circuits, magnetostatics, magnetic fields in matter, induction, AC circuits, electromagnetic waves. In addition to two 75-minute lectures each week, one workshop each week and one three-hour laboratory every other week are required. Students are required to register for a laboratory and workshop/recitation section at the time of course registration. Prerequisites: performance at or above the B+ level in PHY 121; MTH 162 or 172 (may be taken concurrently). (Fall)

143. Waves and Modern Physics (Honors). Second semester of a three-course honors sequence (PHY 141, 143, 142), recommended for prospective departmental concentrators and other science and engineering students with a strong interest in physics and mathematics. Topics are the same as those in PHY 123 but in greater depth. Introductory examinations of Bohr’s atomic model, de Broglie waves, momentum and energy quantization, Heisenberg’s uncertainty relation, Schrödinger’s cat, electron spin, photon interference, and Bell’s inequalities; selected applications to solid-state, nuclear, particle, and astrophysics. In addition to two 75-minute lectures each week, one workshop each week and one three-hour laboratory every other week are required. Students are required to register for a laboratory and workshop/recitation section at the time of course registration. Prerequisites: PHY 141; MTH 162 or 172 (may be taken concurrently). Open to freshmen only. (Spring)

181. Mechanics Laboratory. Laboratory experiments in mechanics: statistics and measurement, transfer students who have not taken the labs. (Fall and Spring)

182. Electromagnetism Laboratory. Laboratory experiments in electricity and magnetism: Coulomb’s Law, electric fields, measurement of the absolute volt, and capacitance, e/m of the electron, superconductivity, and electric circuits. Prerequisites: transfer students who have taken a course equivalent to PHY 122 but have not taken the labs. (Fall)

183. Modern Physics Laboratory. Laboratory experiments in modern physics: velocity of sound, geometrical optics and imaging, the wave nature of light and microwaves, the spectrum of atomic hydrogen, and the Doppler effect experiment. Prerequisites: transfer students who have taken a course equivalent to PHY 123 but have not taken the labs. (Spring)
184. Experiments in Electricity, Magnetism, and Modern Physics. Laboratory experiments in electricity, magnetism, and modern physics: Coulomb’s Law, electric fields, e/m ratio of the electron, superconductivity, electric circuits, geometrical optics and imaging, the wave nature of light, and the spectrum of atomic hydrogen. Prerequisites: for transfer students who have taken a course equivalent to PHY 114 but have not taken the labs. (Spring)

217. Electricity and Magnetism I. Review of vector calculus; electrostatic field and potential; boundary value problems solved with orthogonal functions; the multipole expansion and dielectrics; the magnetic field and vector potential. Prerequisites: PHY 122 or 142; MTH 281 (may be taken concurrently). (Fall)

218. Electricity and Magnetism II. Electromagnetic induction; displacement current; Maxwell’s equations; the wave equation; plane electromagnetic waves; Poynting vector; reflection and refraction; radiation; waveguides; transmission lines; propagation of light; radiation by charged particles; relativistic formulation of Maxwell’s equations. Prerequisite: PHY 217. (Spring)

227. Thermodynamics and Statistical Mechanics. Multiplicity of physical states, thermal equilibrium, entropy and temperature; Boltzmann factor and partition function; statistical approach to free energy; chemical potential; distribution functions for ideal classical and quantum gases, applications to chemical reactions, thermal engines, equations of state and phase transitions. Prerequisites: PHY 237 MTH 281 or ME 201 (may be taken concurrently). (Spring)

235W. Classical Mechanics. Review of elementary mechanics; central force problems; conservation theorems and applications; Fourier and Green’s functions; variational calculus and Lagrange multipliers; Lagrangian and Hamiltonian formulation of mechanics is introduced and applied; oscillations; normal mode theory; rigid body dynamics. The course is designed to satisfy part of the upper-level writing requirement. Prerequisites: PHY 121/141; MTH 281 or ME 201 (may be taken concurrently). (Spring)

237. Quantum Mechanics of Physical Systems. Introduction to quantum mechanics with emphasis on applications to physical systems. Includes Schrödinger’s theory and the one-dimensional Schrödinger’s equation, the hydrogen atom, and selected applications from atomic and molecular physics, quantum statistics, lasers, solids, nuclei, and elementary particles. Prerequisites: PHY 122/142, 123/143; MTH 165/174 may be taken concurrently. (Spring)

243W. Advanced Experimental Techniques I. Students work in pairs and each team is expected to perform three or four experiments from a variety of available setups such as Berry’s phase with light, universal chaos, lifetime of cosmic ray muons, optical pumping, electron diffractions, etc. This is a hands-on laboratory with most experiments under computer control. This course can be used to satisfy part of the upper-level writing requirement. Prerequisites: PHY 217, 237, MTH 164 (may be taken concurrently). (Fall)

244W. Advanced Experimental Techniques II. A continuation of PHY 243W with greater emphasis on independent research and construction of more complicated instrumentation. This course can be used to satisfy part of the upper-level writing requirement. Prerequisites: PHY 217, 237, MTH 164 (may be taken concurrently). (Fall)

245W. Advanced Experimental Techniques in Nuclear, Particle, and Electron Spin Resonance. Similar to PHY 243W except with experiments that have applications in medical physics. The four experiments are: Lifetime of Muon, Electron Spin Resonance/Magnetic Resonance Imaging, Frank Hertz Experiment or Hall Effect, and Nuclear Spectroscopy. This course can be used to satisfy part of the upper-level writing requirement. Prerequisites: PHY 217, 237, MTH 164 (may be taken concurrently). (Fall)

246. Quantum Theory. Formalism of quantum theory with more advanced applications than PHY 237. Includes postulates of quantum mechanics; function spaces, Hermitian operators, completeness of basis sets; superposition, compatible observables, conservation theorems; operations in abstract vector space, spin and angular momentum matrices; addition of angular momentum; perturbation theory, and simple scattering theory. Prerequisites: PHY 237; MTH 281 (or equivalent). (Spring)

250. Advanced Laboratory Project. Similar in level to PHY 243 and 244, but based on extended experimental projects by students as individuals or in small groups. The projects, chosen by mutual agreement between the students concerned and the professor, are intended to provide experience with the concepts and techniques of modern experimental research work. A particular project may be selected from almost any area of modern physics, but it should be strongly interesting to the student. Prerequisites: PHY 243W or 244W (Fall and Spring)

251. Introduction to Condensed Matter Physics. An emphasis on the wide variety of phenomena that form the basis for modern solid-state devices. Topics include crystals, lattice vibrations, quantum mechanics of electrons in solids, energy band structure, semiconductors, superconductors, dielectrics, and magnets. Prerequisites: PHY 217, 227, 257. (Fall)

252. Biomedical Ultrasound. This course provides an analysis of the physical bases for the use of high-frequency sound in medicine (diagnosis, therapy, and surgery) and biology. Topics include acoustic interactions of ultrasound with gas bodies (acoustic cavitation and contrast agents), thermal and nonthermal biological effects of ultrasound, ultrasonography, dosimetry, hyperthermia, and lithotripsy. Prerequisite: MTH 163, 164, PHY 122, 142, or permission of instructor. Cross-listed with BME 251/451.

253. Biological Physics. The purpose of this course is to survey several important areas of biological and medical physics. Topics covered include biological membranes, transport and signaling in cells and tissue, photosynthesis, magnetic resonance imaging, and physical methods in biology such as nuclear magnetic resonance, X-ray diffraction, and optical absorption and fluorescence spectroscopy. The material is presented at the level of Hibbs’ Intermediate Physics for Medicine and Biology. Prerequisites: PHY 227, 237, or permission of instructor.

254. Twentieth-Century Particle Physics. This course is designed for students interested in nuclear and particle physics. The course describes the properties of nuclei and various models used to describe nuclear matter, including the liquid drop model, shell model, collective model, radioactivity, fission, and fusion. Properties of particle interactions with matter are covered and used to describe the principles of detection used in nuclear and particle experiments. In addition, the principle of operation of various existing accelerators is discussed. Finally, the fundamental interactions of elementary particles and their constants are reviewed, with emphasis on conservation of quantum numbers and symmetries observed in high-energy collisions. Prerequisites: PHY 237.

256. Computational Physics. Introduction to numerical and computational methods, with special emphasis on their utilities and applications in contemporary physics topics. Topics covered include introduction of programming, numerical considerations, ordinary and partial differential equations, data analysis, random numbers, fractal growth, Monte Carlo methods. Prerequisites: PHY 121–123 or 141–143. (Spring)

261. Interference and Diffraction. See OPT 261.

262. Electromagnetic Theory. See OPT 262.

265. Computational Methods in Optics. See OPT 211.


301. Seminar in the Physics of Medical Imaging. Credit—2 hours. This seminar course includes the basic physical theory, mathematics, and instrumentation of medical imaging. The course covers the basic properties of matter, radiation, radioactive decay, X-ray systems, digital imaging systems, nuclear medicine systems, radiobiology, ultrasound systems, and magnetic resonance. This course is open only to physics students who plan to earn a certificate in either biological or medical physics or students who are in the B.S./M.S. physics 3-2 program and plan to do an M.S. thesis in medical physics. Prerequisite—permission of instructor. Same as PHY 421.

302. Reading Course: Topics in Health Physics. Credit—2 hours. This course is designed to give student the opportunity to investigate an assortment of topics, which include the history of health physics, interaction of charge particles with matter, operational dosimetry (dose measurements, dose calculations, and dose modeling of charged...
303. Seminar in Physics of Radiation Oncology and Biophysics I. This course is open only to physics students who plan to earn a certificate in either biological or medical physics or students who are in the B.S./M.S. physics 3-2 program and plan to do an M.S. thesis in medical physics. Prerequisite: permission of instructor. Same as PHY 425. (Fall, alternate years)

304. Seminar in Physics of Radiation Oncology and Biophysics II. This course is open only to physics students who plan to earn a certificate in either biological or medical physics or students who are in the B.S./M.S. physics 3-2 program and plan to do an M.S. thesis in medical physics. Prerequisite: permission of instructor. Same as PHY 490.

311A. Mechanics and Chaotic Dynamics. This course is offered the first six weeks of the semester to upper-level undergraduates. Topics covered are Lagrangian and Hamiltonian dynamics, canonical transformations, Hamilton-Jacobi equations, chaotic dynamics and routes to chaos, Fourier spectrum and Poincaré maps, Lyapunov exponents, strange attractors and fractal dimensions, information dimension and Kolmogorov entropy, numerical tests for chaotic behavior. Prerequisites: PHY 235, permission of instructor. Same as PHY 411.

321A. Condensed Matter Physics I. Credit—2 hours. This course is a 2-credit version of the corresponding graduate-level course PHY 521. Prerequisite: permission of instructor.

322A. Introduction to Data Acquisition in the Physics Laboratory. Introduction to computer control, interfacing, and data acquisition in the laboratory. Topics include introduction to digital electronics, interface devices, data conversion devices, A/D converters, I/O ports, interface standards, microprocessor basics, introduction to P-Basic, and applications of microprocessor with PC. No previous experience with computers expected. Prerequisites: PHY 121-123 or 141-143, MTH 161–164.

325. Physics of Radiotherapy I. Use of directly and indirectly ionizing radiation in radiation therapy causing biological damage in the normal tissue and cancer. Radiation delivery techniques are specifically designed and configured to target the neoplasm. The physics of radiation interactions with matter and the clinical use of radiation are presented. The methods of radiation production, measurement of ionizing radiation, absorbed dose as well as the calculation of dose distributions and treatment-planning systems are presented for all radiation modalities. Radiological physics is covered to the extent necessary to explain the use of CT, MR, and PET images as implemented in the treatment planning process. Radiation protection and quality assurance are topics presented at the end of the academic year. This course is open only to physics students who plan to earn a certificate in either biological or medical physics or students who are in the B.S./M.S. physics 3-2 program and plan to do an M.S. thesis in medical physics. Prerequisite: permission of instructor. Same as PHY 425.

326. Physics of Radiotherapy II. Use of directly and indirectly ionizing radiation in radiation therapy causing biological damage in the normal tissue and cancer. Radiation delivery techniques are specifically designed and configured to target the neoplasm. The physics of radiation interactions with matter and the clinical use of radiation are presented. The methods of radiation production, measurement of ionizing radiation, absorbed dose as well as the calculation of dose distributions and treatment-planning systems are presented for all radiation modalities. Radiological physics is covered to the extent necessary to explain the use of CT, MR, and PET images as implemented in the treatment planning process. Radiation protection and quality assurance are topics presented at the end of the academic year. This course is open only to physics students who plan to earn a certificate in either biological or medical physics or students who are in the B.S./M.S. physics 3-2 program and plan to do an M.S. thesis in medical physics. Prerequisite: permission of instructor. Same as PHY 425.

327. Physics of Biophysics I. This course evaluates the effects of radiation in mammalian cell systems ranging from cell cultures to whole animals. Emphasis is on the application of radiobiological principles to radiotherapy practices in the clinical treatment of cancer. Topics include mechanism of radiation damage and repair; cell cycle effects, influence of oxygen, and tumor versus normal tissue effects of radiation. This is similar to the course (same material, different problems for physics students) taken by oncology residents and is taught in the Radiation Oncology/Cancer Center. Prerequisite: permission of instructor. Same as PHY 427.

328. Physics of Biophysics II. This course evaluates the effects of radiation in mammalian cell systems ranging from cell cultures to whole animals. Emphasis is on the application of radiobiological principles to radiotherapy practices in the clinical treatment of cancer. Topics include mechanism of radiation damage and repair; cell cycle effects, influence of oxygen, and tumor versus normal tissue effects of radiation. This is similar to the course (same material, different problems for physics students) taken by oncology residents and is taught in the Radiation Oncology/Cancer Center. Prerequisite: permission of instructor. Same as PHY 428.

331A. Introduction to Quantum Optics. Credit—2 hours. This course is a 2-credit version of the corresponding graduate-level course PHY 551/OPH 551. Prerequisite: permission of instructor.

354. Cosmology. Introduction to cosmology, covering the following broad topics: introduction to the universe, introduction to general relativity, cosmological models and the Friedmann-Walker universe, and thermodynamics of the early universe. This course consists of the first half of AST 554/PHY 554.

381A. Particle Physics I. Credit—2 hours. This course is a 2-credit version of the corresponding graduate-level course PHY 581. Prerequisite: permission of instructor.

382A. Particle Physics II. Credit—2 hours. This course is a 2-credit version of the corresponding graduate-level course PHY 582.

383. Special Topics in Physics. Course on selected topics in physics, offered when justified by sufficient interest. Prerequisite: permission of instructor.

385A. Special Topics in Physics. Credit—2 hours. Course on selected topics in physics, offered when justified by sufficient interest. Prerequisite: permission of instructor.

386. Teaching Internship I, Pedagogy Training. This course is designed for an undergraduate planning to be a workshop leader teaching intern (TI) and can be taken by a laboratory or recitation teaching intern (TI) who plans to use this experience to fulfill part of the requirements for the Citation for Achievement in College Leadership. Typically, the TI attends the weekly workshop leader training meeting that offers specialized support and training in group dynamics, learning theory, and science pedagogy for students facilitating collaborative learning groups for science and social science courses. The TI teaches one workshop, laboratory, or recitation in the fall semester introductory physics courses: PHY 113, 122, 141, or 142. Additional requirements are attendance at the weekly content meetings with a supervising professor, giving feedback to other leaders in a constructive evaluation process, and a project designed in concert with the supervising professor and the PHY 386 instructor. Course is similar to CAS 352.

387. Teaching Internship II, Pedagogy and Group Leadership. This course is designed for an undergraduate planning to be a workshop leader teaching intern (TI) and can be taken by a laboratory or recitation teaching intern (TI) who plans to use this experience to fulfill part of the requirements for the Citation for Achievement in College Leadership. Typically, the TI attends the weekly workshop leader training meeting that offers specialized support and training in group dynamics, learning theory, and science pedagogy for students facilitating collaborative learning groups for science and social science courses. The TI teaches one workshop, laboratory, or recitation in the spring semester introductory physics courses: PHY 113, 122, 141, or 142. Additional requirements are attendance at the weekly content meetings with a supervising professor, giving feedback to other leaders in a constructive evaluation process, and a project designed in concert with the supervising professor and the PHY 386 instructor. Course is similar to CAS 352.
388/389. Teaching Internship I. The student typically spends one or two semesters teaching an introductory physics laboratory section, working with a graduate TA. Faculty supervision is augmented by training, ongoing teaching seminars, and a constructive evaluation process. Prerequisite: permission of instructor. (Fall and Spring)

389. Teaching Internship II. The student typically spends one or two semesters teaching an introductory physics laboratory section, working with a graduate TA. Faculty supervision is augmented by training, ongoing teaching seminars, and a constructive evaluation process. Prerequisite: permission of instructor. (Fall and Spring)

390. Supervised Teaching of Physics. Credit—2 hours. Introduction to the techniques of physics instruction, active observation, and participation in the teaching of an undergraduate course under the guidance of a faculty member. Prerequisite: permission of department and instructor. (Fall, Spring, and Summer)

390A. Supervised Teaching with Leadership Focus. This course is designed for an experienced undergraduate planning to be a workshop leader, laboratory or recitation teaching intern (TI) who is planning to use this experience to fulfill part of the requirements for the Citation for Achievement in College Leadership. The TI is expected to attend the weekly leader training meetings supporting PHY 386–387. In recognition of the student’s experience, the TI takes on some mentoring and course organizational tasks. Students spend the semester teaching one workshop, laboratory, or recitation section during the fall/spring semester introductory physics courses: PHY 113, 114, 121, 122, 123, 141, 142, and 143. Additional requirements are attendance at weekly content meetings with a supervising professor and giving feedback to other leaders in a constructive evaluation process. An additional project is required which may or may not coincide with the mentoring and course organizational tasks mentioned above. This course may be taken more than once.

391. Independent Study. Independent study under the direction of a faculty member of the Department of Physics and Astronomy. (Fall, Spring, and Summer)

391W. Independent Study. Independent study project under the direction of a faculty member of the Department of Physics and Astronomy. This course includes a writing component and can be used to satisfy part of the upper-level writing requirement. (Fall, Spring, and Summer)

395. Independent Research. Independent research project under the direction of a faculty member of the Department of Physics and Astronomy. (Fall, Spring, and Summer)

395W. Independent Research. Independent research project under the direction of a faculty member of the Department of Physics and Astronomy. This course includes a writing component and can be used to satisfy part of the upper-level writing requirement. (Fall, Spring, and Summer)

GRADUATE PHYSICS

Many graduate courses in physics and astronomy are available as 2-credit hour “half-courses” at a level appropriate for undergraduates.


408. Quantum Mechanics II. Symmetries including parity, lattice translations, and time reversal. Stationary-state and time-dependent perturbation theory. Stark and Zeeman effects, the fine structure, transition probabilities. Scattering theory with applications. Elementary QED, multipole and plane-wave expansions, properties of the photon. The Dirac equation and elementary mass renormalization. Prerequisite: PHY 407 or equivalent.

411. Mechanics and Chaotic Dynamics. Lagrangian and Hamiltonian dynamics, canonical transformations, Hamilton-Jacobi equations, chaotic dynamics and routes to chaos, Fourier spectrum and Poincaré maps, Lyapunov exponents, strange attractors and fractal dimensions, information dimension and Kolmogorov entropy, numerical tests for chaotic behavior. Prerequisite: PHY 235W.

412. Computational Methods for Scientists and Engineers. See ME 403.

413. Gravitation. Motivation for a metric theory of gravity, principle of equivalence, principle of general covariance, mathematical tools, curvature tensor, Einstein field equations and solutions, energy momentum tensor, weak field approximation, applications and optional topics.


420. Introduction to Condensed-Matter Physics. See PHY 251. Same as PHY 251/ECE 220 and ECE 440.

421. Seminar in the Physics of Medical Imaging. See PHY 301.

422. Medical Imaging Theory and Implementation. Physics and implementation of X-ray, ultrasonic, and MR imaging systems. Special attention is given to the Fourier transform relations, reconstruction algorithms of X-ray and ultrasonic-computed tomography, and MRI. Prerequisite: ECE 242. Same as ECE 452/OPT 452/BME 452.

423. Reading Course: Topics in Health Physics. See PHY 302.

424. Biological Physics. Physical aspects of special topics in biology. The purpose of this course is to survey several important areas of biological and medical physics. Topics covered include properties of biological membranes, transport and signaling in cells and tissue, photosynthesis, magnetic resonance imaging, and physical methods in biology such as nuclear magnetic resonance, X-ray diffraction, and optical absorption and fluorescence spectroscopy. The material is presented at the level of Russeu K. Hobbie’s, Intermediate Physics for Medicine and Biology. The course is graded on the basis of regular homework sets, two hourly exams, and a term paper. Prerequisites: PHY 227, PHY 237, or instructor permission. Same as PHY 253.


426. Physics of Radiotherapy II. See PHY 326.

428. Physics of Radiobiology II. See PHY 328.
440. Twentieth-Century Particle Physics. Nuclei, nuclear forces, conservation laws, elementary particles, their interactions, and static properties. Same as PHY 254.
445. Advanced Experimental Techniques in Nuclear, Particle, and Electron Spin Resonance. See PHY 245W.
446. Nuclear Science and Technology I. See CHM 466.
454. Introduction to Plasma Physics/ Stability I. Orbit theory, adiabatic invariants, MHD equations, waves in plasma, shock waves in plasma, diffusion across magnetic fields and in velocity space. Prerequisite: electrodynamics. Same as ME 434.
455. Introduction to Plasma II. Vlasov equation, Landau damping, VanKampen modes, shield clouds, two-stream instability, micro-instabilities, drift instability, nonlinear instability theory radiation from plasma. Prerequisite: PHY 454 or permission of instructor. Same as ME 435.
475. Experimental Particle Physics for High School Teachers. The department hosts the PARTICLE (Physics and Rochester Teachers Inventing Classroom Experiments) program. Students (high school teachers) study the methods and techniques of experimental particle physics research by participating in the design and construction of detectors for classroom-based cosmic ray experiments. Prerequisite: permission of instructor.
490. Seminar in the Physics of Radiation Oncology and Biophysics I and II. Master’s reading course in medical physics. Restricted to physics students who plan to earn a certificate in biological or medical physics, or who are in the B.S.M.S. physics 3-2 program and plan to do an M.S. thesis in medical physics. Prerequisite: permission of instructor. Same as PHY 305 and 304.
491. Reading Course at the Master’s Level. Special study or work, arranged individually for master’s candidates.
492. Certificate in Teaching of College Physics or Physics and Astronomy. After serving as lead teaching assistants (TAs), students teach a course during the University’s summer session. Students successfully completing the Graduate Teaching program are awarded a Certificate of College Teaching in Physics and Astronomy to be presented during the graduation ceremony in May.
493. Special Topics in Physics I. Subject matter to be selected by instructor and students on an ad hoc basis in specific areas at the master’s level.
494. Special Topics in Physics II. Subject matter to be selected by instructor and students on an ad hoc basis in specific areas at the master’s level.
498. Supervised Teaching I. This course is designed for students to become laboratory or recitation teaching assistants (TAs). Typically, students spend the semester teaching two laboratories during the fall semester. Attendance at the weekly teaching seminars, giving feedback to other leaders, and a constructive evaluation process are required. This course is noncredit and may be taken more than once. Students are required to attend a two-day rigorous training program two weeks prior to the beginning of the fall semester. Students prepare and present a short model recitation and are videotaped for self-evaluation.
499. Supervised Teaching II. Continuation of PHY 498.
509. Introduction to Nonrelativistic Many-Body Systems. Classical fields, number representation for Bose and Fermi many-body systems, quantized fields, field methods of perturbation theory, applications to non-relativistic many-body systems. Prerequisites: PHY 407, 408 or equivalent.
511. Field Theory. Path integral formulation of quantum mechanics, free harmonic oscillator, fermionic oscillator, instantons, free scalar field, Green’s functions, generating functional statistical mechanics as Euclidean field theory, partition function as a path integral, free Bose gas, interacting theories, Green’s functions and scattering amplitudes at tree level, symmetry, Ward identities, symmetry breaking and Goldstone theorem, effective action at one loop, 1d Ising model, 2d Ising model, duality, high and low temperature expansions, transfer matrix, scaling of coupling with lattice size.
512. Renormalization. Background and introduction to renormalization, one loop divergences in perturbation theory, and Callan Synzamik equation. The renormalization group and Wilson’s point of view, effective actions, and operator product expansion. Prerequisite: PHY 509 or 510.
513. Magnetic Resonance Imaging: From Spins to Brains. See BCS 513. Prerequisite: PHY 422/ECE 452.
516. Electromagnetic Theory II. A continuation of PHY 415 covering special relativity, radiation from moving charges, radiation damping, scattering and electrodynamics in material media. Prerequisites: PHY 401, 403, 415 (may be taken concurrently).
519. Statistical Mechanics II. A continuation of PHY 418, involving the theory of imperfect gases, phase transition, and Brownian motion. Prerequisites: PHY 402, 408, 418.
521. Condensed-Matter Physics I. Classification of solids by crystal lattice, electronic band structure, phonons, and optical properties; X-ray diffraction, neutron scattering, and electron screening. Prerequisites: PHY 407, 408, 420, or permission of instructor.
522. Condensed-Matter Physics II. Electron-phonon interaction, transport, magnetism, and topics of current interest such as superconductivity or localization, to be determined by the instructor. Prerequisite: PHY 521.
525/524. Special Topics in Condensed-Matter Physics. Subject matter to be selected by the instructor from among topics of current interest in solid state. Prerequisite: PHY 521.
527. Computational Neuroscience in Physics. See BCS 547.
531. Introduction to Quantum Optics. Classical and quantum mechanical theories of the interaction of light with atoms and molecules, with emphasis on near resonance effects, including coherent nonlinear atomic response theory, relaxation and saturation, laser theory, optical pulse propagation, dressed atom-radiation states, and multi-photon processes. Prerequisites: PHY 401, 402, 407, 408, 415 or permission of instructor; PHY 514 recommended
532. Quantum Optics of Electromagnetic Field. Properties of the free quantized electromagnetic field, quantum theory of coherence, squeezed states, theory of photodetection, correlation measurements, atomic resonance fluorescence, cooperative effects, quantum effects in nonlinear optics. Prerequisites: PHY 531 is recommended.
533. Quantum Optics of the Atom-Field Interaction. Subject matter is selected from topics of current interest in quantum optics.
534. Mechanical Effects in the Atom-Field Interaction. Subject matter is selected from topics of current interest in quantum optics.
535. Modern Coherence Theory. Coherence and special topics in coherence. Same as OPT 592.
536. Special Topics in Quantum Optics. Same as OPT 556.
538. **Advanced Topics in Light Wave Technologies.** See OPT 532.

539. **Waveguide Optoelectronic Devices.** See OPT 568.

541. **Nuclear Science I.** Nuclear models and symmetries in nuclei; shell model, models pertinent in regions of strong pairing interactions, including BCS and generalized seniority; the microscopic theory of vibrations; rotational structures in heavy and light nuclei. Prerequisites: PHY 408 and either PHY 440 or permission of instructor.

542. **Nuclear Structure I.** Electromagnetic and weak transitions; sum rules, introduction to nuclear reactions, theory of nuclear forces. Prerequisite: PHY 541.

544. **Special Topics in Nuclear Physics.** Subject matter to be selected from among advanced topics in the theory of nuclear structure and nuclear reactions. Prerequisites: PHY 541, 542.

546. **Nuclear Science and Technology II.** Experimental and theoretical studies of heavy-ion scattering and reaction mechanisms; semiclassical and quantal scattering theory; Coulomb excitation; few-nucleon transfer; damped heavy-ion reactions; fusion and fission processes; statistical approaches to complex nuclear reaction mechanisms. Prerequisite: PHY446/CHM466. Same as CHM 566. (Fall, follows PHY 446, offered every other year)

552. **Magnetohydrodynamics.** See ME 532.

553. **Laser-Plasma Interactions.** See ME 535.

554. **Cosmology.** See AST 554.

555. **Advanced Topics in Plasma Physics.** See ME 545.

556. **Hydrodynamic Stability and Turbulence.** See ME 556.

557. **Plasma Stability.** See ME 534.

564. **Seminar on High-Energy Astrophysics.** See AST 564.

581. **Particle Physics I.** Particle interactions and their symmetries. The particle spectrum and its classification. Calculation of elementary processes. The quark model. CP violation. Accelerators and experimental techniques. Prerequisites: PHY 408, PHY 509 (may be taken concurrently).

582. **Particle Physics II.** Electroweak theory and experimental evidence in support of it. Gauge theories and spontaneous symmetry breaking. QCD and color SU(3). Grand unification and recent advances. Particles and cosmology. Prerequisite: PHY 509.

584. **Special Topics in Particle Physics.** Subject matter is to be selected from topics of current interest in particle physics. Prerequisite: PHY 582.

591. **Reading Course at the Ph.D. Level.** Credit to be arranged. Special study or work, arranged individually.

597. **Graduate Teaching and Research Seminar.** Credit—none. Course is given once per week; required for all first-year graduate students. The seminar consists of lectures and discussions on various aspects of being an effective teaching assistant, including interactions with undergraduate student body and cross-cultural issues. (Fall and Spring)

598. **Teaching Workshop Leader Pedagogy Training.** Credit—none. This course is designed for students to be workshop leader teaching assistants (TAs). Typically, TAs attend the weekly workshop leader training meeting, which offers specialized support and training in group dynamics, learning theory, and science pedagogy for students facilitating collaborative learning groups for science and social science courses. TAs teach three to four workshops in one of the fall semester introductory physics courses: PHY 113, 122, 141, or 142. Attendance at the weekly Graduate Teaching Seminar (PHY 597A), giving feedback to other leaders, and a constructive evaluation process are required. Course may be taken more than once.

599. **Pedagogy and Group Leadership.** Credit—none. This course is designed as a follow-up course after taking PHY 598, for experienced workshop leaders, titled lead workshop leader teaching assistants (TAs). Typically, TAs attend the weekly workshop leader training meeting, which offers specialized support and training to develop leadership skills, to foster ongoing communication among faculty members and study group leaders, and to provide an environment for review of study group-related issues. Students spend the semester teaching three to four workshops during the spring semester introductory physics courses: PHY 114 and 121. Attendance at the weekly Graduate Teaching and Research Seminar (PHY 597B), giving feedback to other leaders, and a constructive evaluation process are required. Lead Workshop TAs are required to work closely with the faculty mentor/instructor in charge of the course. Lead Teaching Assistants have additional responsibilities that may include small projects, giving review sessions, serving on occasion as substitute lecturers and are required to play a major role in the TA Training Program for the following academic year. Course may be taken more than once.

ASTRONOMY

102. **Black Holes, Time Warps, and the Origin and Large-Scale Structure of the Universe.** In AST 102 we present a physical and astronomical (but non-mathematical) picture of the workings of Einstein’s theory of relativity, and its application to cosmology and to black holes and wormholes, the most exotic and energetic objects known to scientists. Our aim is twofold: (1) to demystify black holes, big-bang cosmology, and the nature of space and time for non-science majors, to enable them to evaluate critically the frequent references to these exotic concepts in the press and in popular science and science-fiction literature; and (2) to provide non-science majors with a glimpse of the processes by which scientific theories are conceived and advanced. In the course we make heavy use of computer-generated graphics and simulations during lectures, make available all course-related resources in an extensive World Wide Web site, and use the WeBWorK system for homework. Prerequisites: none. (Fall)

104. **The Solar System.** To acquaint the nonphysical science concentrator with aspects of the historical and modern study of the solar system, including results from space probe studies, and with theories dealing with the evolution of the solar system. Prerequisites: high school math through intermediate algebra. No physics required. (Fall)

105. **Introduction to the Milky Way Galaxy.** In this course we introduce students to our home galaxy, the Milky Way, and use the structure and contents of this normal galaxy to illustrate the origins of stars like the Sun, the origins of the chemical elements from which we are formed, and the evolution of galaxies through the life of the universe. The emphasis in the presentation is on the descriptive astronomy and the physical principles describing the operation of the various celestial objects, with a minimum of mathematical detail. Prerequisites: none. (Spring)

111. **Elementary Astronomy I: The Solar System.** An introductory survey of observational astronomy intended for physical science majors. Typical topics include celestial coordinates and time, light detectors and measurement, introductions to celestial mechanics and planetary structure, properties of stars, stellar evolution, galactic structure, galaxies, cosmology. The course is open to freshmen. Laboratory included and required, recitations available. Prerequisite: PHY 113/114 or 121, and MTH 141 or 161 (may be taken concurrently). (Fall)

142. **Elementary Astrophysics.** The techniques learned in the first year of physics and math are applied in this course to the study of stars, interstellar matter, galaxies, and cosmology. A laboratory is included and required; it involves experiments, in the lab and with telescopes, on spectroscopy, distance determination and imaging of some celestial objects discussed in the lecture portion of the course. Prerequisites: PHY 121, 122 (may be taken concurrently); MTH 142, 161, 162; AST 111 recommended. (Spring)

203W. **Astronomical Techniques.** The course is an introduction to the tools of modern observational astronomy. Geometrical and physical optics, applied to telescopes and astronomical cameras, are discussed. The physics of light detection, from radio to gamma-ray wavelength, and the instruments and techniques used for observation of faint celestial sources at those wavelengths are featured. The material should be useful to anyone using remote-sensing instruments, astronomical or otherwise. This course is the same as AST 203, except with additional writing assignments. May be used towards satisfying the upper-level writing requirement.

232W. **The Milky Way Galaxy.** This class focuses on our home galaxy and all that’s in it. After a review of some aspects of fundamental astrophysics, students learn about the
Interstellar Medium (ISM) and its life-cycle, the role of stars and stellar evolution in determining the characteristics of the ISM, star formation, stellar death, supernova, planetary nebulae, galactic structure, galactic kinematics, spiral wave theory, and the galactic center. This course is the same as AST 232, except with additional writing assignments. May be used towards satisfying the upper-level writing requirement. Prerequisite: familiarity with PHY 235 and AST 142 is advised. (Fall, odd years)

241. Astrophysics I. This introduction to the physics of stars is taken primarily by juniors and seniors majoring in physics and astronomy, physics, optics, or mathematics. The elements of radiative transfer and gas dynamics are presented and applied to the study of the atmospheres of stars. The interior structure and evolution of stars of various types are also discussed. Prerequisite: PHY 237 (may be taken concurrently); familiarity with the subject matter of AST 111 and/or 142 is advised. (Spring, odd years)

242. Astrophysics II. This introduction to the physical processes in astronomical objects is taken primarily by juniors and seniors majoring in physics, physics and astronomy, optics, or mathematics. Topics discussed include physical processes in the interstellar medium; star formation and molecular clouds; the structure of galaxies; and interaction to cosmology. Prerequisite: PHY 237 (may be taken concurrently); familiarity with subject matter of AST 142 is advised. (Spring, even years)

383. Special Topics in Astronomy. Selected topics offered when justified by sufficient interest.

391. Independent Study. Independent study project under the direction of a faculty member of the Department of Physics and Astronomy. (Fall, Spring, and Summer)

391W. Independent Study. Independent study project under the direction of a faculty member of the Department of Physics and Astronomy. This course includes a writing component and can be used to satisfy part of the upper-level writing requirement. (Fall, Spring, and Summer)

393. Senior Project. Completion of an independent research project under the direction of a faculty member of the Department of Physics and Astronomy. (Fall, Spring, and Summer)

393W. Senior Thesis. Completion of an independent research project under the direction of a faculty member of the Department of Physics and Astronomy. This course includes a writing component and can be used to satisfy part of the upper-level writing requirement. (Fall, Spring, and Summer)

395. Independent Research. Independent research project under the direction of a faculty member of the Department of Physics and Astronomy. This course includes a writing component and can be used to satisfy part of the upper-level writing requirement. (Fall, Spring, and Summer)

403. Experimental Techniques in Astronomy. This course is an introduction to the tools of modern observational astronomy. We discuss geometrical and physical optics applied to telescopes and astronomical cameras; the physics of light detection at radio, infrared, visible, X-ray, and γ-ray wavelengths; and the instruments and techniques used for observations of faint celestial objects over the full useful range of spectral and angular resolution. The intention is to provide students the preparation necessary to design, build, and optimize astronomical instruments. However, the material should be useful to anyone who will be using remote-sensing instruments, astronomical or otherwise, or is seeking to understand measurements made with these devices. Prerequisites: The equivalent of PHY 217, 218, ME 201 or MTH 281, and PHY 227.


453. Stellar Interiors and Stellar Atmospheres. A first course on interiors and atmospheres devoting approximately 50 percent of a semester to each. See AST 450 and AST 553 for full-fledged courses.

455. Astronomical Interferometry. This course is an introduction to the principal technique of modern radio astronomy, and an increasingly important tool for infrared and visible wavelengths: spatial interferometry. We discuss the elements of physical optics, coherence theory, and the physics of detectors and receivers that bear on astronomical interferometry; following this formal development with a detailed account of the practice of interferometry, calibration, and data reduction. The intention is to provide to students all they need to know to understand, plan, propose, and analyze observations with such instruments as the Very Large Array (VLA), the Very Long Baseline Array (VLBA), the Owens Valley Radio Observatory’s (OVRO) Millimeter Array, and the Berkeley-Illinois-Maryland Array (BIMA) at Hat Creek Radio Observatory. Prerequisites: AST 403, PHY 415.

461 and 462. The Physics of Astrophysics I & II. A new yearlong course sequence designed to provide prospective astronomy/astrophysics students with physics tools they need in addition to those taught in the usual physics sequence. Many examples of the use of these tools in astrophysical contexts are provided. The course is designed to be taken starting the fall of the second year of graduate study, and is intended to be intensive (>3 hours/week class time), with weekly problems and a final exam.


552. Galactic Dynamics. Boltzmann equation and collision theory. Structure and evolution of clusters, numerical experiments, Galactic hydrodynamics, wave theory of spiral arms, models of galactic nucleus regions, superdense cluster theory.


554. Cosmology. General relativity with emphasis on astronomical applications: experimental tests; black holes; relativistic star models; cosmological models; early stages of evolution of the universe; gravitation waves. Same as PHY 554.

563. Seminar on Radio Astronomy and Infrared Astronomy. A survey of current research reports in scientific journals on topics including research on pulsars, quasars, and radio and infrared observations of the interstellar medium.

564. Seminar on High Energy Astronomy. A survey of current research reports in scientific journals on topics concerning astrophysical plasma physics, magnetic field-particle interactions, gravitational and general relativity, and early stages of evolution of the universe. Same as PHY 564.

POLISH AND CENTRAL EUROPEAN STUDIES

COMMITTEE ON POLISH AND CENTRAL EUROPEAN STUDIES

Kathleen Parthé, Ph.D. (Cornell) Professor of Russian
Celia Applegate, Ph.D. (Stanford) Professor of History
Ewa Hauser, Ph.D. (Johns Hopkins) Adjunct Associate Professor of Political Science
James D. Johnson, Ph.D. (Chicago) Associate Professor of Political Science
Randall Stone, Ph.D. (Harvard) Associate Professor of Political Science; Director of the Skalny Center for Polish and Central European Studies
The Skalny Center for Polish and Central European Studies provides students with an opportunity to develop an interdisciplinary knowledge of Polish and Central European politics, history, cultures, and international relations with Eastern (Russia/Soviet Union/Post-Soviet States) and Western Europe, as well as with the United States. An interdisciplinary major or minor in Polish and Central European Studies (PCES) may be designed through the Center and is administered through the College Center for Study Abroad and Interdepartmental Programs. The Center itself offers a Certificate in Polish and Central European Studies.

Course offerings include courses taught by the College faculty as well as by visiting scholars from Poland and Central Europe. Some of the course offerings are taught at the Jagiellonian University in Krakow. It is strongly recommended that those interested in developing their knowledge of this region participate in one of the University of Rochester-sponsored one-semester study abroad programs in Poland or Central Europe. Students interested in the certificate should contact Professor Ewa Hauser in the Department of Political Science. Those planning to study in Poland should inquire at the Skalny Center for Polish and Central European Studies about Skalny Scholarships. Students interested in a major or minor in Polish and Central European Studies can obtain detailed information from the Center for Study Abroad and Interdepartmental Programs.

COURSE REQUIREMENTS

The Polish and Central European Certificate Program provides students with an opportunity to develop an interdisciplinary knowledge about Poland and Central Europe. Interested students should put together a list of 10 courses (or 40 credit hours) with the following departmental distribution:

1. Six courses from the Primary list:
   a. Four must be in social sciences (political science, economics, or history)
   b. Two must be in languages (any western Slavic language, Romanian, Hungarian, or Yiddish) or cultures (anthropology, art, film studies, music, philosophy, theater, or religion)

2. Four additional courses from either the Primary or Secondary list. Substitutes for these courses may be approved by the student’s PCE studies director. Up to two substitute courses may be foreign language courses above the 105 level.

Courses transferred from another college must be approved by the student’s PCE studies director. No primary course may be taken satisfactory/fail, and no more than one secondary course may be taken satisfactory/fail. Students must earn an overall grade-point average of at least 2.0 in courses submitted for the certificate. Upon graduation, students successfully completing the PCE studies program will receive a Certificate in Polish and Central European Studies.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

PRIMARY COURSES

Political Science and History
- PSC 106. Introduction to International Relations.
- HIS 205. Europe Since 1945.
- PSC 251/ANT 262. Old and New Nationalism in Eastern Europe.
- PSC 255/ANT 262. Political Films: Poland and Eastern Europe.
- PSC 256. Globalization of Post-Communist Economics.
- PSC 262. Post-Communist Politics.
- PSC 269. Communism and Democracy in Eastern Europe.
- PSC 270. International Politics.
- PSC 272. Theories of International Relations.
- PSC 274. International Political Economy.
- PSC 377. Perspectives on War and Peace: Central Europe.
- HIS 116. History of Poland.
- HIS 206/REL 218. The Holocaust.
- HIS 351. Topics in Nationalism and National Identity.
- HIS 301W. The Holocaust.

Languages and Cultures
- POL 101. Elementary Polish I.
- POL 102. Elementary Polish II.
- POL 103. Polish Review.
- POL 107. Polish in Poland.
- POL 151. Intermediate Polish.
- YDH 101. Introductory Yiddish.
- YDH 102. Intermediate Yiddish.
- REL 289. Literature of the Shetl.

Primary Courses Offered Occasionally by Visiting Faculty
- ENG 355V. Joseph Conrad.
- PSC 156. U.S. Policy toward Eastern Europe during the Cold War.
- PSC 158. Holocaust Film from Europe.
- PSC 254. Political Economy of Post-Communism.
- PSC 256. Central European Political Economy.
- PSC 257. Small Town Transitions in Poland.

SECONDARY COURSES

ANT 222. Nations and Nationalism.
HIS 100. Europe before 1492.
HIS 113. Europe in the Nineteenth Century.
HIS 114. Europe in the Twentieth Century.
HIS 117. Women in History: Modern Europe.
HIS 150/RUS 128. Russian Civilization.
HIS 151. History of Imperial Russia.
HIS 152. Stalin’s Russia.
HIS 153/RUS 127. Russia Now.
PSC 101. Introduction to Comparative Politics.
PSC 350. Problems in Comparative Politics.
PSC 351. Western European Politics.
RST 224. Russian Art.

A current list of courses (including courses offered by visiting faculty on a one-time basis) is available at the Skalny Center for Polish and Central European Studies.

POLITICAL SCIENCE

John Duggan, Ph.D. (California Institute of Technology) Professor of Political Science and of Economics

Thomas H. Jackson, J.D. (Yale) Distinguished University Professor of Political Science, Distinguished University Professor of Business Administration in the William E. Simon Graduate School of Business Administration, and Professor in the W. Allen Wallis Institute of Political Economy

Bruce Jacobs, Ph.D. (Harvard) Professor of Political Science; University Dean of Graduate Studies

Richard G. Niemi, Ph.D. (Michigan) Don Alonzo Watson Professor of Political Science

Charles E. Phelps, Ph.D. (Chicago) Professor of Political Science, of Economics, and of Community and Preventive Medicine

G. Bingham Powell, Jr., Ph.D. (Stanford) Marie Curran Wilson and Joseph Chamberlain Wilson Professor of Political Science

Lynda W. Powell, Ph.D. (Rochester) Professor of Political Science

Tjll van Geel, Ed.D. (Harvard) Professor of Education and of Political Science

Lawrence S. Rothenberg, Ph.D. (Stanford) Professor of Political Science

Joel Selgman, J.D. (Harvard University Law School) Professor of Political Science and Professor of Business Administration in the William E. Simon Graduate School of Business Administration; President of the University

Mark Fey, Ph.D. (Caltech) Associate Professor of Political Science
The faculty also includes a large number of the discipline’s emerging young stars, scholars, and teachers engaged in innovative and award-winning work.

The department is constantly conscious of the relationship between teaching and scholarly research. William H. Riker, who established the graduate program at Rochester in the early 1960s, always held that scholarship consists in the production and dissemination of knowledge, and that publication and teaching ought to fit almost seamlessly together in that process. Thus, along with faculty distinguished for their research and publications, the department is proud to house recipients of the College’s and University’s highest awards for teaching at the undergraduate and graduate levels. Today, as throughout the department’s history, the faculty remain committed to the principle that world-class teaching and research are complements. New research enriches and energizes the department’s teaching, and good teaching forces faculty constantly to reevaluate research findings in light of new facts, questions, and events.

Through coursework and internships—including programs in Brussels, London, Washington, and the local offices of the district attorney and public defender—the department presents students with multiple opportunities to study and immerse themselves in the hurly-burly of politics. Undergraduate students gain familiarity with American political behavior and institutions, political systems in other countries, the sources of international conflict and cooperation, political theory, and the systematic analysis of data and evidence. The department supports research and teaching centers in African-American politics and international politics, and it enjoys close working relationships with centers in political economy, Polish and Central European politics, and women’s studies.

The department’s distinctive strength is its emphasis on teaching students to look beyond unique events to general truths. The faculty are committed to providing students with the ability and tools to think for themselves about the world they inhabit—to question, to write clearly, to make and defend assertions, and to understand the relationship between theory and evidence. All students concentrating in political science take a course in basic political methodology, which provides them with the ability to read and interpret data. And all students are required to take a course in argument, providing them with a framework to construct, defend, and criticize theories and evidence. Moreover, the department is distinctive in supporting a range of undergraduate courses in positive political theory. Students have a wide range of courses from which to choose, and they are encouraged to explore their interests with depth and passion. Every member of the faculty teaches undergraduates as well as graduate students, and all undergraduate concentrators are advised by full-time faculty members. Classes are generally small, and undergraduates have many opportunities to pursue scholarship at an advanced level.

For more information on political science, visit the departmental Web site at www.rochester.edu/college/PSC.

REQUIREMENTS FOR CONCENTRATION IN POLITICAL SCIENCE

For the full set of concentration requirements, visit the departmental Web site at www.rochester.edu. The Web site is regularly updated with new courses, advising information, department events, office hours, and other information relevant to concentrators.

The concentration in political science requires that students successfully complete at least 12 courses, achieving a minimum overall grade-point average of 2.0 in these courses. None of the 12 courses may be taken on a satisfactory/fail basis. As part of their concentration, students must fulfill the department’s upper-level writing requirement.

The 12 courses are PSC 202, four political science field requirements, and seven other courses:

- PSC 202, Argument in Political Science, is the only course specifically required for a concentration in political science.
- Four field requirements:
  - a. Techniques of Analysis. PSC 200, 201, or 204. (Students may also satisfy this requirement with ECO 230 or 231. However, ECO 230 or 231 counts as a course in an allied field rather than as a course in political science.)
  - b. American Politics. Choose at least one course from the list of approved courses.
  - c. Comparative Politics or International Relations. Choose at least one course in either field from the list of approved courses.
  - d. Positive Theory or Political Philosophy. Choose at least one course in either field from the list of approved courses.
- Seven additional courses:
  - a. Students may choose any seven additional courses in political science. These may include any courses from the various fields, but may also include individualized research courses, internships, and associated courses. No more than three of these, however, may be chosen from the list of associated courses. As many as three of these seven courses may come from another department, provided they follow the guidelines in the next paragraph for courses in an allied field. Also, no more than four courses counted toward the concentration may be at the introductory level (generally, 100-level courses); of these four introductory courses, no more than one may come from another department.
Note on allied field: Courses in the allied field (up to three) may consist of any courses from either economics, history, or philosophy, provided that the courses come from the same department and that no more than one of these courses is at the introductory level. For courses from other departments or for interdepartmental allied fields, advisors expect students to provide a coherent justification for the courses chosen. A general guideline used to determine acceptability of a proposed allied field is that the courses enhance the students’ understanding of politics. Proposals that cut across departments or that include more than one introductory-level course require special justification. Changes to allied field courses other than those in the three listed departments must be approved in writing by an advisor.

HONORS IN POLITICAL SCIENCE
Each fall the Department of Political Science invites a select group of top juniors with a concentration in political science to take part in the honors program. The Honors Coordinator assesses the pool of political science juniors and coordinates invitations based on grades in political science courses, overall GPA, and nominations from the faculty. Political science juniors who seek to enter the honors program but have not been invited to do so may petition the Honors Coordinator to be considered for admission. Places in the honors program are limited.

Attainment of honors in political science requires successful completion of the junior honors seminar (PSC 389W), offered in the spring of the third year, and a year-long senior honors project supervised by a full-time faculty member in the Department of Political Science. Typically, the senior honors project is a work of 60 to 120 pages in length. Evaluation of the project is not, however, a reflection of the quantity of pages but of the quality of the work: a good idea and thorough and successful original research are in fact the sole requirements for an acceptable project. The senior honors project should be an original contribution to knowledge in political science. This may entail original research on a question that has received little scholarly attention in political science or an original contribution to scholarship on a question of recognized importance in the discipline.

For more information on the honors program, visit the departmental Web site at www.rochester.edu/college/PSC/undergrad/minors.php#honors.

REQUIREMENTS FOR A MINOR IN POLITICAL SCIENCE
The minor in political science requires that students successfully complete five courses, of which only one may be from the list of introductory (100-level) courses. None of the five courses may be taken on a satisfactory/fail basis. The five courses must be distributed in the following fashion:
1. PSC 202, Argument in Political Science, is the only course specifically required for a minor in political science.
2. Techniques of Analysis. PSC 200, 201, or 204.
3. American Politics. Choose one course from the list of approved courses.
4. Comparative Politics or International Relations. Choose one course in either field from the list of approved courses.
5. Positive Theory or Political Philosophy. Choose one course in either field from the list of approved courses.

CLUSTERS IN POLITICAL SCIENCE
For students with a concentration in the humanities, the natural sciences, or engineering, the Department of Political Science offers a large and varied set of clusters. For more information on the department’s clusters, including the courses available in each cluster, visit the departmental Web site at www.rochester.edu/college/PSC/undergrad/minors.php#clusters. These are clusters offered in political science:
1. America and the World.
2. American Political History.
4. Comparative Politics.
5. European Politics and Civilization.
6. International Relations.
7. Poland, Russia, and Central Europe.
8. Political Economy.
9. Political Methods and Theory.
10. Political Philosophy.
13. World Politics.

UPPER-LEVEL WRITING REQUIREMENT
Political science majors fulfill the department’s writing requirement by taking PSC 202 and one or more 200- or 300-level courses in political science that are designated as writing intensive. These courses carry a “W” designation. “W” courses require students to write a term paper of 10–15 pages (about 3,500 words), with the term paper involving research that goes beyond the regular class material. Faculty are encouraged to have students submit a draft of a portion of the term paper before they turn in the final product.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

REQUIRED COURSE
202. Argument in Political Science. Introduces students to the questions, concepts, and analytical approaches of political scientists. Possible topics vary from semester to semester. One version of the course focuses on the tension between majority rule and minority rights in the American political tradition, using classic texts in American political thought (such as the Declaration of Independence, The Federalist, and Tocqueville’s Democracy in America) as well as books and articles written by contemporary political scientists. Another version focuses on racial and gender conflict in American political life. Other versions may draw on material from comparative politics, political theory, or international relations.

TECHNIQUES OF ANALYSIS
200. Applied Data Analysis. Introduces the study of politics through data analysis, including instruction in the use of computers and basic statistical software.
201. Political Inquiry. Introduces the nature of research in political science. Topics include the scientific method, the development of hypotheses about political phenomena, and the analysis of data.
204. Research Design. In this class, students learn the techniques behind designing research studies that allow political scientists and economists to answer hot-button political questions.

AMERICAN POLITICS
103. Great Debates in American Democracy. Examines some of the great debates and crises that have shaped the American political system. Same as HIS 163.
105. Dilemmas in American Politics. Examines how America has attempted to resolve, and sometimes succeeded in resolving, several important political dilemmas. Key issues include how America should govern itself, who to include among its citizenry, and how to balance the interests of individuals against those of the states and the nation as a whole.
121. Democracy in America. Democracy literally means “rules by the people.” This definition raises various questions, which are explored in the context of twentieth-century American politics.
124. Race and Politics in American History. Examines how race has shaped and influenced the development of American political institutions.
194. Rochester Politics and Places. Focuses on the rich history of Rochester as well as learning about current debates over political organization, racial and economic segregation, suburbanization, and economic change.
203. Twentieth-Century African-American Political Thought. Surveys the political and social thought of African-Americans during the twentieth century. The course critically assesses such perspectives as liberalism, nationalism, feminism, and Marxism as considered by important black thinkers of the era.
209. Interest Groups in America. Introduces issues that concern political scientists and economists about interest groups in American politics.
210. **Development of the American Party System.** Examines the emergence of political parties in the United States, debates over the legitimacy and purpose of party organization, and changes in the American party system over time.

211. **Public Opinion and Voting.** Examines public opinion and voting, with special attention to generational differences. How much do citizens know about government and politics? Does participation make a difference? Do elected officials do what the public wants?

212. **The Supreme Court in U.S. History.** Through lecture, readings, and discussion, students consider major questions involving public opinion and voting, paying special attention to generational matters.

214. **Political Participation in the United States.** Seminar surveying the ways in which individuals and groups participate in political processes and the functions these activities serve. Same as AAS 214.

215. **American Elections.** Examines topics in state and national elections, including the electoral college, campaign finance reform, and the role of money in elections.

216. **Legislative Politics.** Examines Congress in its dual roles as both a national lawmaking institution and as the nexus of public representation in the policymaking process.

217. **Politics and Mass Media.** Analyzes the interaction of politics and mass media, focusing on techniques of opinion manipulation, campaigning, and the use of polls.

218. **Emergence of the Modern Congress.** Seminar on major issues in congressional history and legislative development. Same as HIS 342.

220. **Social Movements in the United States.** Surveys social movements in the United States, including Populist, labor, civil rights, and women's movements. Same as AAS 220.

222. **The Presidency.** Studies recent presidential campaigns and presidential leadership in both foreign and domestic policy.


224. **African-American Politics.** Surveys the political strategies adopted by African-Americans since Reconstruction to forge organized resistance to racial domination in the United States. Same as AAS 224.

225. **Race and Political Representation.** Introduces democratic theory, the civil rights movement, the Voting Rights Act, African-American public opinion and electoral behavior, and the effect of electoral rules and districting decisions on representation.

231. **Money in Politics.** Seminar examines the role of money in the U.S. political process, including the historical development of campaign finance law, the electoral effects of campaign spending and contributions on public policy outcomes, and various reform proposals.

237. **Domestic Social Policy.** Introduces the content, rationale, assumptions, and development of selected domestic policies.

238. **Business and Politics.** Examines how corporations affect and are affected by politics. Topics include regulation, lawmaking, campaign finance, the mass media, and interest group mobilization.

239. **The Nature and Foundations of Entrepreneurship.** Looks beyond traditional concepts and considers actions which transform ideas into enterprises that generate intellectual, social, cultural, religious, or economic value. Uses theory, data, case studies, and guest speakers to investigate the meaning of "entrepreneur" and what characterizes the entrepreneurial society.

241. **Urban Change and City Politics.** Seminar examines the politics and history of American cities. The course emphasizes the ways in which ethnicity, race, and class shape experiences over housing, neighborhoods, workplaces, schools, and governmental institutions. Same as HIS 260.

243. **Environmental Politics.** An examination of environmental problems and issues from a social scientific perspective.

245. **Aging and Public Policy.** Covers policies in such areas as social security, public assistance, health care, and social services for the elderly.

249. **Sports and the American City.** Examines the relationship between sports and American urban life. Same as HIS 261.

291. **The First Amendment and Religion in America.** Closely examines key aspects of the First Amendment to the U.S. Constitution, with particular attention to the issue of freedom of religion.

**COMPARATIVE POLITICS**

101. **Introduction to Comparative Politics.** Introduces students to a wide variety of political institutions, processes, and outcomes in countries across the globe.

250. **Conflict in Democracies.** Why are some democracies able to keep political conflict within constitutional boundaries while others are not? Theories for the political setting and theories of choices are analyzed by citizens and leaders are used to explore the nature of democratic conflict.

253. **Comparative Political Parties.** Focusing on parties in the comparative context, comparing and contrasting the strengths and weaknesses of parties in an evolving political order.

255. **Democratic Regimes.** Surveys the main theoretical and empirical issues around the topic of democratization. Examples are drawn from a broad array of countries in Latin America and Europe.

261. **Latin American Politics.** Introduces the political development and the current context of politics in Latin America with a specific focus on the experiences of Argentina, Brazil, Chile, Peru, and Mexico.

262. **Globalization Past and Present.** This class systematically examines the implications of economic globalization for domestic and international politics. Emphasis is given to the lessons of nineteenth-century globalization for politically relevant issues of the present such as the effect of greater factor mobility in income distribution, economic growth, political coalitions, policy-setting autonomy, and the viability of the welfare state.

263. **Comparative Law and Courts.** Analyzes legal and judicial systems in different countries, with special emphasis on Latin America.

264. **Comparative Political Institutions.** This seminar deals with political institutions and their implications for the behavior of political actors and their effects on social outcomes.

265. **Race, Politics, and Global Society.** Examines the formation of racial solidarity in the political sphere, state policies regarding racial inequality, and how race as a social construct operates as a political resource for both racially dominated groups and for institutionalized political entities. The course covers the United States, South Africa, the United Kingdom, Brazil, and others. Same as AAS 265.

267. **Identity, Ethnicity, and Nationalism.** Draws upon theories from political science, anthropology, sociology, and economics to explore concepts of identity, ethnicity, and nationalism from a comparative perspective.

271. **Russia and Eastern Europe.** Explores the domestic politics and foreign relations of Russia and its East European neighbors, with roughly equal attention to historical and contemporary developments.

274. **International Political Economy.** Presents an overview of the international political economy and the role of nation-states within it. Same as ECO 272.

**INTERNATIONAL RELATIONS**

106. **Introduction to International Relations.** Surveys theories of international relations, focusing on explanations of conflict and cooperation. The course introduces game theory and illustrates numerous applications in international relations.

262. **Globalization Past and Present.** This class systematically examines the implications of economic globalization for domestic and international politics. Emphasis is given to the lessons of nineteenth-century globalization for politically relevant issues of the present such as the effect of greater factor mobility in income distribution, economic growth, political coalitions, policy-setting autonomy, and the viability of the welfare state.
272. **Theories of International Relations.** Surveys approaches to theory-building in international relations, with some emphasis on attempts to explain war and its causes.

274. **International Political Economy.** Presents an overview of the international political economy and the role of nation-states within it. Same as ECO 272.

279. **War and the Nation State.** Examines the development of warfare and growth of the state.

**POSITIVE POLITICAL THEORY**

107. **Introduction to Positive Political Theory.** Through examples drawn from all aspects of the political process—from elections to lawmaking to regulation—studies how the rules of the game affect the decisions politicians make as well as the policy outcomes we observe.

272. **Theories of International Relations.** Surveys approaches to theory-building in international relations, with some emphasis on attempts to explain war and its causes.

280. **The Politics of Delegation.** This course introduces students to some of the big questions raised by political delegation, and to the basic tools that positive political theorists use to grapple with these questions.

281. **Formal Models in Political Science.** Introduces the “rational choice” approach to understanding political phenomena. The basics of social choice theory, game theory, and spatial modeling are presented through application to a broad range of political situations.

285. **Strategy and Politics.** Examines recent descriptive theories of political behavior (including theories derived from the theory of games, social choice theory, and economic models) in order to arrive at a general theory of political strategy. Prerequisite: PSC 202.

286. **Political Economy.** What determines the size of government, the extent and type of public good provision, the effect of interest groups and lobbying on legislators, and the connection between business and electoral cycles? These are the types of questions that this course addresses.

288. **Game Theory.** Introduces game theory, which provides a unified approach to understanding social phenomena. Examples of situations to which we will apply the theory include arms races, provision of public goods, competition between firms, electoral campaigns, voting, auctions, and bargaining.

**POLITICAL PHILOSOPHY**

104. **Introduction to Political Philosophy.** Examines a range of contemporary political issues and explores the philosophical conflicts and controversies that those issues raise.

121. **Democracy in America.** Democracy literally means “rules by the people.” This definition raises various questions, which are explored in the context of twentieth-century American politics.

203. **Twentieth-Century African-American Political Thought.** Surveys the political and social thought of African-Americans during the twentieth century. The course critically assesses such perspectives as liberalism, nationalism, feminism, and Marxism as considered by important black thinkers of the era.

221. **Philosophical Foundations of the American Revolution.** This course examines the philosophical foundations of the American Revolution by examining the political theory that lies behind the revolution itself and that underlies the foundations of the Constitution. Same as PHI 221.

282. **Art and Politics.** Draws on art history, literature, and political theory to explore the ways that politics and the practices of artistic representation intersect. Much of the course treats questions of race and identity.

283. **Contemporary Political Theory.** Explores themes of reason and sovereignty in political thought from the late eighteenth century through the present.

284. **Democratic Theory.** Focuses on various topics in democratic theory, such as the relation between democracy and other basic political principles (liberty, equality, justice), whether democratic institutions should be aggregative or deliberative, and the role of referenda, lotteries, and new telecommunications technology in democratic decision making.

285. **Strategy and Politics.** Examines recent descriptive theories of political behavior (including theories derived from the theory of games, social choice theory, and economic models) in order to arrive at a general theory of political strategy. Prerequisite: PSC 202.

286. **Political Economy.** An interdisciplinary course that focuses on the application of economic logic to political questions and the influence of political institutions and behavior on economic activity.

287. **Theories of Justice.** Introduces competing theories of justice and examines the implications of these theories in areas of contemporary social and political controversy.

289. **Political and Philosophical Perspectives on Equality.** Explores patterns of social and economic inequality and their implications for democratic politics. Readings are drawn from classic and contemporary work in social science, political theory, and philosophy.

291. **The First Amendment and Religion in America.** Closely examines key aspects of the First Amendment to the U.S. Constitution, with particular attention to the issue of freedom of religion.

292. **Rousseau to Revolution.** In this course students study the political philosophy of Rousseau and the French Revolution. Same as PHI 324.

ASSOCIATED COURSES AND ELECTIVES

226. **Black Power Movement and American Politics.** This course explores the origins and development of black power radicalism and its impact on American politics. Same as AAS 297.

227. **New York State Politics.** Competition and compassion—two values often at odds with each other—have long dominated New York’s political culture. The course examines the effects of these values on the contemporary politics, political institutions, and public policies of the Empire State.

229. **Racial and Ethnic Politics.** This course explores the origins and development of black power radicalism and its impact on American politics. Same as AAS 227.

233. **Community Development and Political Leadership.** Examines changing community development policy at local, state, and national levels, and the dynamics among public, private, and nonprofit sectors in American cities. Special attention is paid to the role of political leaders who set strategic directions for private investment and neighborhood renewal in urban communities.

240. **Criminal Procedures and Constitutional Principles.** Examines statutory and constitutional criminal procedure issues.

246. **Women in Politics.** Examines the participation of women in American political life.

251. **New Nationalisms.** Taking the post-Communist 1990s as a point of departure, this course explores the roots and fates of different varieties of nationalism in Eastern Europe. Same as ANT 262.

254. **Political Economy of Post-Communism.** Post-Communist transformation is a historical event leading from a centrally planned to a market-driven economy. Focuses on structural adjustment policies, stabilization, privatization, liberalization, and the political economy of transition to a market.

255. **Political Films.** Studies the development of cinema under Communism, with special attention to the Polish film school and the post-Communist search for a new cinema. Same as ANT 250.

256. **Central European Political Economy.** Seminar addresses questions including political and economic liberalization, the process of institution-building, and cultural changes indispensable for the development of civic society and post-Communist economies.

257. **Poland in the New Europe.** Provides an introduction to Poland’s modern history, focusing primarily on political and social history, highlighting significant cultural phenomena and developments where appropriate.

259. **Central European Politics and Government.** Examines transition from Communism as a cultural process. Focuses on various institutions, the rule of law as the basis of the new social order, and the effect of totalitarian/authoritarian regimes on attitudes and social behavior.

269. Communism and Democracy in Eastern Europe. Analyzes the rise and fall of Communism in the European part of the Soviet Empire between 1945 and 1989 and the subsequent years of building democratic institutions anew.

276. The Arab-Israeli Conflict. This course introduces the chronology and context of the conflict, as well as the primary factors influencing the conflict, from the late nineteenth century onward.

INDIVIDUALIZED RESEARCH COURSES

389. Junior Honors Seminar. (Spring)
390. Supervised Teaching.
391. Independent Study. Work beyond the regular course offerings done by arrangement between students and full-time faculty.
392. Practicum.
393. Senior Honors Project. Yearlong independent project, working one-on-one with faculty member. (Fall and Spring)

INTERNSHIPS

394. Local Law and Politics Internships. Available in the offices of the public defender, the district attorney, and city hall, as well as in individualized internships.
396. Washington Semester Program. One semester’s work in Washington, D.C., as a member of the staff of a U.S. senator or representative.
397. European Political Internships. Internships are available in London, Brussels, Paris, Madrid, Edinburgh, Berlin, and Bonn. Internship placements include legislatures, such as the European Parliament, the British Parliament, the Scottish Parliament, the French Senate and Chamber of Deputies, and the German Bundestag. A wide variety of internships are available in law offices, political party offices, interest groups, research groups, public affairs offices, and quasi-governmental agencies, such as the United Nations; specific placement opportunities vary by country. Appropriate language skills are required.

ADVANCED SEMINARS IN POLITICAL SCIENCE

Qualified students are encouraged to consider additional 300-level seminars that include graduate students. For most, enrollment requires permission of instructor.

310. Political Parties and Elections.
316. Political Participation.
319. American Legislative Institutions.
335. Bureaucratic Politics.
350. Comparative Politics Field Seminar.
351. Western European Politics.
355. Democratic Processes.
356. Political Economy of Reform.
364. Comparative Political Economy.
372. Topics in International Relations.
373. Territory and Group Conflict.

374. Topics in International Political Economy.
380. Scope of Political Science.
383. Culture and Politics.

THE INTRODUCTORY COURSE

PSY 101. Introduction to Psychology, is a balanced and integrated survey of psychology with coverage of both social and natural science domains. Sections of PSY 101 vary, but most consist of lectures, readings, discussions, and demonstrations. One fall section is limited to freshmen only. (Fall and Spring)

CORE COURSES IN PSYCHOLOGY

Core courses in psychology present surveys of their specific areas. They enter into the requirements for the major and the minors in psychology. The current core courses are:

• PSY 110. Neural Foundations of Behavior
• PSY 112. Cognitive Psychology
• PSY 113. Biopsychology of Social and Clinical Behaviors
• PSY 161. Social Psychology
• PSY 171. Social and Emotional Development
• PSY 181. Theories of Personality and Psychotherapy

PSYCHOLOGY COURSES OFFERED BY CLINICAL AND SOCIAL SCIENCES IN PSYCHOLOGY

All courses beyond PSY 101 offered by this department are cross-listed as CSP and PSY. See the Department of Clinical and Social Sciences in Psychology for course descriptions (page 49).

PSY 101. Introduction to Psychology
PSY 113. Biopsychology of Social and Clinical Behaviors
CSP 161. Social Psychology and Individual Differences
CSP 171. Social and Emotional Development
CSP 181. Theories of Personality and Psychotherapy
CSP 209. Psychology of Human Sexuality
CSP 211. Introduction to Statistical Methods in Psychology
CSP 219W. Research Methods in Psychology
CSP 262. Human Motivation and Emotion
CSP 263. Relationship Process and Emotions
CSP 264. Industrial/Organizational Psychology
CSP 267. Psychology of Gender
CSP 278. Adolescent Development
CSP 280. Clinical Psychology
CSP 282. Abnormal Psychology
CSP 283. Behavioral Medicine
CSP 289. Developmental Child Psychopathology
CSP 301. Teaching Psychology
CSP 309. Honors Seminar
CSP 310–311. Honors Research I & II
CSP 361. Social Psychology: Self-Concept
CSP 364. Achievement and Motivation
CSP 366. Social Psychology and Control
CSP 367W. Gender and Mental Health
CSP 368W. Seminar in Humanistic Psychology
CSP 371. Seminar in Social and Personality Development

PSYCHOLOGY COURSES OFFERED BY CLINICAL AND SOCIAL SCIENCES IN PSYCHOLOGY

All courses beyond PSY 101 offered by this department are cross-listed as CSP and PSY. See the Department of Clinical and Social Sciences in Psychology for course descriptions (page 49).

PSY 101. Introduction to Psychology
PSY 113. Biopsychology of Social and Clinical Behaviors
CSP 161. Social Psychology and Individual Differences
CSP 171. Social and Emotional Development
CSP 181. Theories of Personality and Psychotherapy
CSP 209. Psychology of Human Sexuality
CSP 211. Introduction to Statistical Methods in Psychology
CSP 219W. Research Methods in Psychology
CSP 262. Human Motivation and Emotion
CSP 263. Relationship Process and Emotions
CSP 264. Industrial/Organizational Psychology
CSP 267. Psychology of Gender
CSP 278. Adolescent Development
CSP 280. Clinical Psychology
CSP 282. Abnormal Psychology
CSP 283. Behavioral Medicine
CSP 289. Developmental Child Psychopathology
CSP 301. Teaching Psychology
CSP 309. Honors Seminar
CSP 310–311. Honors Research I & II
CSP 361. Social Psychology: Self-Concept
CSP 364. Achievement and Motivation
CSP 366. Social Psychology and Control
CSP 367W. Gender and Mental Health
CSP 368W. Seminar in Humanistic Psychology
CSP 371. Seminar in Social and Personality Development
In addition to the above, at least 10 courses be used to meet this requirement. PSY 211, STT 211, or STT 212 are strongly rec-

major.

PSY 101 or the equivalent must be com-

1.

the B.A. degree.

This major partially fulfills requirements for

BCS 208. Laboratory in Perception and

Cognition

BCS 220. The Intelligent Eye

BCS 221. Audition

BCS 228. The Human-Machine Interface

BCS 242. Neuropsychology

BCS 246. Biology of Mental Disorders

BCS 259. Language Development

BCS 261. Language Use and Understanding

REQUIREMENTS FOR THE MAJOR IN

PSYCHOLOGY

This major partially fulfills requirements for the B.A. degree.

1. PSY 101 or the equivalent must be completed before the student is accepted into the major.

2. An acceptable statistics course, preferably by the end of the sophomore year. PSY 200, PSY 211, STT 211, or STT 212 are strongly recommended, but STT 165 or 202–203 may also be used to meet this requirement.

3. In addition to the above, at least 10 courses comprising the following:

a. Two of the three core courses in natural science aspects of psychology: PSY 110, 112, and 113. BCS 111 may be substituted for BCS/PSY 112.

b. Two of the three core courses offered in social science aspects of psychology: PSY 161, 171, and 181

c. Four further PSY courses, NOT including independent studies or Quest courses

d. Two more courses, including independent studies in psychology. These may be PSY courses or they may be courses in an allied field that inform the student’s pursuit of psychol-

ogy. Allied field courses may not be psychol-

ogy courses. At the time of declaring the major, the student should be prepared to argue for the appropriateness of the allied field choices.

i. Two of the psychology courses must be designated upper-level writing courses and one of these must be at or beyond the 200 level.

j. Pursuant to College rules, all courses in the major must be completed with a cumulative average of 2.0 (C) or better.

As many as two psychology courses in addi-
tion to the introduction and statistics courses may be transferred into the major from other institutions. Transferred courses into the major must be explicitly approved.

HONORS DEGREE IN PSYCHOLOGY

Students should form the intention and plan to enter the honors program by the first semester of their junior year or before. Suc-

cess in this program requires commitment to a working engagement with research in psychology. Students in the honors program should secure a faculty mentor early on in their pursuit of the degree. Most students in the honors program intend to pursue graduate study in psychology, and the program is tailored to their preparation for that goal.

Requirements for the honors degree in psychology:

1. Completion of the requirements for the major in psychology and for the honors degree with a cumulative grade-point average of 3.3 or better in psychology courses.

2. The student’s program must include

   a. PSY 219W: Research Methods in Psychol-

ogy, or other formal laboratory course

   b. One 300-level or higher course in psy-

chology

   c. PSY 309, Honors Research Seminar, or, if

this course is not available, either a second

upper-level seminar in psychology or an

independent study in psychology

   d. PSY 310, Honors Research I, and PSY 311,

Honors Research II

   e. Completion of acceptable senior thesis

MINORS IN PSYCHOLOGY

PSY 101, Introduction to Psychology, or its equivalent is required for all minors. Declaration of a minor should be done with a CSSP faculty advisor. A student may complete only one minor in psychology, and may not do both the major and a minor in psychology.

1. Psychology

Five courses in addition to PSY 101:

• Three core courses in psychology of which at least one must be a natural science course (PSY 110, Neural Foundations of Behavior; PSY 112, Cognitive Psychology, or BCS 111; or PSY 113, Biopsychology of Social and Clinical Behaviors), and one a social science course (PSY 161, Social Psychology and Indivi-

dual Differences; PSY 171, Social and Emotional Development; PSY 181, Theories of Personality and Psychotherapy)

• Two further courses in psychology (PSY)

2. Psychology as a Natural Science

Four courses in addition to PSY 101:

• At least one natural science psychology core course (PSY 110, Neural Foundations of Behavior; PSY 112, Cognitive Psychology, or BCS 111; or PSY 113, Biopsychology of Social and Clinical Behaviors)

• At least one course from the following: PSY 150, Learning and Memory; PSY 151, Percep-

tion and Action; or PSY 153, Cognition and Language

• One or two further natural science psy-

chology courses, at least one of which is numbered 200 level or above. Independent study courses are acceptable

3. Psychology as a Social Science

Four courses in addition to PSY 101:

• Two of the three social science psychology core courses (PSY 161, Social Psychology and Individual Differences; PSY 171, Social and Emotional Development; or PSY 181, Theories of Personality and Psychotherapy)

• Two further social science psychology courses (CSP/PSY)

4. Organizational Psychology

Four courses in addition to PSY 101:

• PSY 161, Social Psychology and Individual Differences

• PSY 181, Psychology of Personality and Psychotherapy

• PSY 264, Psychology of Industrial and Organizational Psychology

• One course from the following: PSY 262, Human Motivation and Emotion; PSY 355, Seminar in Group Dynamics and Organiza-

tional Behavior; any 300-level social psy-

chology (CSP/PSY) seminar, independent study, or practicum in organizational psy-

chology

5. Health Psychology

Five courses in addition to PSY 101:

• PSY 110, Foundations of Neurobiology or PSY 113, Biopsychology of Social and Clinical Behaviors

• PSY 181, Theories of Personality and Psychotherapy

• PSY 282, Abnormal Psychology

• PSY 283, Behavioral Medicine

• One course from the following: PSY 289, Childhood Psychopathology; PSY 382, Seminar in Abnormal Psychology; or any advanced biopsychology course, inde-

pendent study, or other approved course or practicum
advised to discuss the 3-2 program with their undergraduate advisor as well as with the director of the M.P.H. program. Early planning for the 3-2 program is essential as applicants must demonstrate completion of all undergraduate requirements before beginning a graduate program in what is their senior year of college. We urge potential applicants to consider whether they might get more from the M.P.H. program if they postponed it until after college or even after other graduate study and/or work experience. Additionally, undergraduates who are heavily involved in campus activities may want to postpone graduate study in public health until after they graduate from college, since the demands of first-year M.P.H. study presuppose a high level of commitment to graduate program requirements.

The 3-2 M.P.H. program works by having students in their senior year in the College apply credits from the M.P.H. program toward their undergraduate degree. During the first year in the 3-2 M.P.H. program, students are considered to be senior undergraduates for purposes of registration and financial aid. Their courses, however, are all taken in the M.P.H. program and will count as graduate courses toward the M.P.H. degree. The typical course load for first-year 3-2 M.P.H. students is at least 12 credits per semester (most graduate courses carry 3 credits), and thus it is not feasible for students to overload at the same time with courses necessary to complete undergraduate requirements. The sole exception to this is that health and society majors in the 3-2 M.P.H. program can use one of the M.P.H. courses as a substitute for the Health and Society Senior Seminar. Students majoring in other fields must make special arrangements with their departments to complete any remaining undergraduate course requirements before beginning the 3-2 M.P.H. program.

Admission to the 3-2 M.P.H. program is highly selective. In addition to strong Graduate Record Examination scores, the Admissions Committee looks for an accomplished academic record and demonstrated commitment to pursue graduate study. The Admissions Committee favorably considers community service, work experience, and participation in research relevant to public health. Strong endorsements by referees who know the applicant in both academic and non-curricular settings are also most helpful to the committee. Furthermore, because the M.P.H. student body is predominately composed of adult students, the Admissions Committee looks for 3-2 applicants who have a high level of self-confidence and can “hold their own” in a diverse group of adult learners. An applicant’s decision to withdraw a 3-2 application in favor of an additional year of college or to gain work experience will be viewed without prejudice by the Admissions Committee if the applicant re-applies at a future time.

### RELIGION AND CLASSICS

Douglas R. Brooks, Ph.D. (Harvard) Professor of Religion and Chair of Committee on Asian Studies

Th. Emil Homerin, Ph.D. (Chicago) Professor of Religion

Paul Muller-Ortega, Ph.D. (California, Santa Barbara) Professor of Religion

Edward Wierenga, Ph.D. (Massachusetts) Professor of Religion and of Philosophy Chair of the Department

Daniel Beaumont, Ph.D. (Princeton) Associate Professor of Arabic Language and Literature

Curt Cadorette, Ph.D. (University of St. Michael’s College) Associate Professor of Religion and John Henry Newman Associate Professor of Roman Catholic Studies

Alfred Geier, Ph.D. (Johns Hopkins) Associate Professor of Classics

Anthea Butler, Ph.D. (Vanderbilt) Assistant Professor of Religion

Anne Merideth, Ph.D. (Princeton) Assistant Professor of Religion

Nora Rubel, Ph.D. (North Carolina, Chapel Hill) Assistant Professor of Religion
HONORS IN RELIGION
1. Eight credits of honors coursework with a grade of at least B+ selected from the following honors courses:
   • REL 293, Theories of Religion
   • REL 389, Senior Seminar
   • REL 390, Supervised Teaching
   • REL 392, Honors Research. Independent study taken as preparation for writing the senior thesis.
2. REL 393, Senior Thesis
3. A successful oral defense of the thesis.

MINOR IN CLASSICAL CIVILIZATION
Six courses are required, including:
1. A course focusing on the history of the ancient world, e.g., CLA 102, 210.
2. A course surveying the literature and/or mythology of the ancient world, e.g., CLA 135, 140.
3. Four additional courses, which may include language courses as well as courses in translation; 101 and 102 courses in the languages may count.

MINOR IN ARABIC
1. ARA 101 and 102, or the equivalent.
2. Four courses of close textual analysis and interpretation, chosen from a wide range of Arabic texts, and read in the original language.

UPPER-LEVEL WRITING REQUIREMENT
The Department of Religion and Classics is committed to teaching students to think critically, read closely, and write in a clear and cogent style. The department requires students concentrating in religion or classics to undertake a significant amount of writing in courses contributing to their major. As a result, the upper-level writing requirement will be fulfilled by virtue of completing the requirements for either a concentration in religion or a concentration in classics.

MINOR IN RELIGION
1. Either REL 101 or 102.
2. One course in the history of a religious tradition, either REL 103, 104, 105, 106, 107, or 108.
3. REL 293.
4. Three other courses in religion, selected in consultation with the student’s advisor in the department.

REQUIREMENTS FOR CONCENTRATION IN CLASSICS
The concentration in classics is language-centered. Coursework in Greek and Latin is supplemented by studies in ancient literature, religion, philosophy, history, art, and archaeology. The goal of the concentration is to be able to analyze and interpret significant texts in the ancient languages and to understand their cultural context. Students may choose a concentration in classics (both languages), or in Greek or Latin alone; all majors, however, are encouraged to take at least one year of each language, if possible.

A minimum of 11 courses is required, including:
1. At least six language courses numbered 103 or above.
3. A course focusing on the philosophical writings of the ancient world, e.g. CLA 142, 202.
4. A course surveying the language and/or mythology of the ancient world, e.g. CLA 135, 140.

A senior project is required, demonstrating the student’s ability to meaningfully interpret an ancient text or texts, read in the original language; it may be completed as part of a senior thesis or in conjunction with the junior/senior seminar or other appropriate course.

MINOR IN LATIN
Six courses in Latin; may include LAT 101 and 102.

MINOR IN GREEK
Six courses in Greek; may include CGR 101 and 102.

MINOR IN ARABIC
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MINOR IN LATIN
Six courses in Latin; may include LAT 101 and 102.

MINOR IN GREEK
Six courses in Greek; may include CGR 101 and 102.
The study of the tradition of the Jewish people from their origins to the present. First, we examine the historical context of ancient Israel and its relationship with neighboring societies. We then turn to the development of Judaism as a religious tradition, focusing on key figures and texts. Finally, we explore the significance of Judaism in the modern world, including its role in shaping contemporary thought and culture.

For more information, please refer to the course catalog or contact the instructor.
its respective poetic tradition. The course examines various theologies of lecture including writers from South Africa, Latin America, and men and women from North America. Same as AAS 246.

235. Religion and Society in Latin America. This course examines the relationship between religion and various Latin American societies, past and present. Although it pays particular attention to the Christian tradition, indigenous religious systems are also examined.

236. Catholicism in American Life. A study of the development of Catholicism from broadly cultural perspectives; political, social, economic, artistic, philosophical, and theological elements are considered of American Catholicism’s story.

237. Peru in Depth. This is a University of Rochester Study Abroad Summer Program focusing on the cultural, political, socioeconomic, and religious nature of Peru, offering students insight into one of Latin America’s most complex and fascinating countries.

238. Native American Art and Religion. A sustained study of the third-century meditation and Yoga traditions of India. A study of the Prophet Muhammad, the Qur’an, and their importance to medieval and modern Muslim culture. The prophet’s life and major themes of the Qur’an will be discussed together with interpretations of them found in Islamic legal, theological, philosophical, and mystical writings.

241. Qur’anic Arabic. Study of the Arabic of the Qur’an—its vocabulary, grammar, and syntax. All primary readings in Arabic and drawn from the Qur’an. Prerequisite: completion of ARA 102 or equivalent; previous or concurrent enrollment in REL 240 is highly recommended though not required. Same as ARA 241.

243. Islamic Mysticism. An advanced introduction to mystical life in Islam which studies mystical experience and theory and traces the importance of Islamic mysticism to religion, philosophy, art, and literature as found in medieval and modern Muslim societies.

244. Islamic Mystical Poetry. In this course students read and analyze Islamic mystical verse in English translation largely from Arabic, Persian, Turkish, and Urdu. Following an intensive introduction to Islamic mysticism, specific poems are studied with particular attention given to the religious contents and functions of this verse and to its place within its respective poetic tradition.

247. Islam and the Third World. An examination of the important and often dramatic changes occurring in modern Islam in context of Third World political, social, and economic factors. Same as AAS 278.

250. Shiva and Shakti. Study of the Divine Couple, the Great God of Hinduism and his consort, through myth, poems, stories, artistic forms, temples, and Tantric philosophies.

255. Hindu Goddesses and Women. We consider the ways in which women understand themselves as Hindus and the ways in which they have been understood. Same as WST 249.


259. Hindu Mystical Poetry. This course concentrates on close readings of mystical poetry written in the Hindu tradition both in Sanskrit and in vernacular languages.

260. Hindu Ascetics, Mystics, and Doctors. A close study of Hindu traditions focused on the theories and practices of esoteric Yoga, Tantra, and medicine.

261. Hindu Tantric Yoga. Two texts of Kashmiri Shaivism serve as a focus for an advanced introduction to the mysticism of the Hindu Tantras. Additional readings explore its historical and philosophical dimensions.

264. Buddha, Meditation, Nirvana. An introduction to Buddhism: its founder and early origins; its sacred literature and evolution; with a particular focus on the role of early Buddhist meditation practices.


269. Tibetan Buddhism. A critical examination of the development of Buddhism in Tibet.

270. Medicine, Alchemy, and Religion in India. An introduction to the Indian traditions of medicine, healing, and self-transformation from historical, theoretical, and practical perspectives.

Religion in Art and Literature

238. Native American Art and Religion. Same as AH 280.

279. Romanesque Art and Architecture. Same as AH 238W.

281. British Art of the Middle Ages. Same as AH 240.

282. The Arts of Buddhist Asia. Same as AH 226.


METHODOLOGICAL AND PHILOSOPHICAL COURSES

290. Race, Religion, and Genocide in the Twentieth Century. Course investigates some of the major events of the twentieth century which have perpetrated presuppositions about the nature of God, humanity, and perfection that rely on the persecution of the “Other,” with the goal of understanding how religious motivations can turn to destructive ends.


293. Theories of Religion. An investigation of important methodological contributions to the critical study of religion.

295. Religions and Society. Same as ANT 265.

297. Freedom and the First Amendment. A close examination of key aspects of the First Amendment to the U.S. Constitution, with particular attention to the issue of freedom of religion.

Archaeology

200. Introduction to Archaeology. An examination of the methods and theoretical approaches of archaeology, and a comparative investigation of material culture and patterns of colonization in the ancient Mediterranean and early America.

201. Archaeology of Comparative Colonization. This introductory course explores how archaeologists use material culture to study Europe’s physical expansion in the Classical and Early Modern periods. Same as HIS 224.

299. Field Methods in Archaeology.

ADVANCED COURSES AND SEMINARS

310. Seminar in Mahâbhârata. A study of the Mahâbhârata, the great Hindu epic, focusing on the symbolism of its narrative and the problems involved in its interpretation of myth and ritual.

312. Seminar in Zen Buddhism. A focused examination of the intellectual and historical origins of Zen Buddhism, including works from Basho, Dogen, and Nishitani.

315. Lived Religion in America. This course both considers the literature and theoretical engagements of the study of “Lived Religion” in the American context, and provides students with both a theoretical basis of lived religion, as well as introduction to texts and ethnographies that address the complexity of “Lived Religion.”

389. Senior Seminar. Topics, methods, and theoretical models in the study of religion. Restricted to senior religion majors.

390. Supervised Teaching.
Greek grammar and readings in an unadapted 

102. Classical Greek II. An introduction to Classical Greek designed to prepare students to read the Classical Greek dramatists, philosophers, orators, and historians, and the New Testament. (Fall)


202. Homer’s Odyssey. Selections from the Odyssey of Homer read in Greek. The entire Odyssey read in English and discussed.

206. Plato’s Phaedrus. Study of the language and thought of the Phaedrus. (Spring)

209. Plato’s Meno. Translation and close study of Plato’s Meno. Skill in translating and advancement of the knowledge of Greek is stressed.

210. Euripides, An exploration of the language and thought of Euripides through a reading of one of his best-known plays—either the Medea, Hippolytos, Bacchae, or Alcestis.


391. Independent Study. By arrangement with the chair and with the consent of an instructor, to permit work beyond the regular course offerings. Limited to juniors and seniors with background in the selected area of reading.

392. Honors Research.

393. Senior Thesis. A directed, individual study project open to senior concentrators.

394. Internship.

ARABIC

101. Elementary Arabic I. An introduction to Modern Standard Arabic including the alphabet, pronunciation, vocabulary, grammar, elementary conversation, and reading. (Fall)

102. Elementary Arabic II. Continuation of ARA 101. (Spring)

103. Intermediate Arabic I. Readings, drills, and continued study of grammar.

104. Colloquial Egyptian Arabic. This course introduces the student to the Egyptian Arabic dialect, the language spoken in every-day life in Egypt. Open to students of Modern Standard Arabic as well as to students with no prior study of Arabic.

148. The Arabian Nights. The Arabian Nights, a classic of world literature, is discussed in terms of the major themes—love and sex, comedy and adventure—that have given the stories their universal appeal and their timeless relevance. The readable English translation of Powys Mathers is used, and classes are mostly devoted to discussion.

149. Contemporary Fiction from the Arab World in Translation. This course introduces the students to major Arab authors of contemporary novels and short stories in excellent translations.

201. Arabic Prose Seminar I. Intensive readings to increase vocabulary. Weak verbs and conditional sentences complete the study of grammar.

202. Arabic Prose Seminar II. Contemporary short stories from the Arab World in Arabic. The class is designed to expand students’ vocabulary and improve the speed with which they read literary Arabic.

203. Arabic Prose Seminar III. Content varies; offered upon request.


HEBREW

NOTE: Hebrew 101 and 102, or the equivalent, are prerequisites to all Hebrew courses at the 200 level.

101. Elementary Hebrew I. Introduction to the structure of Modern Hebrew. Practice in vocabulary, use, grammar, reading, and writing. Same as JST 101. (Fall)

102. Elementary Hebrew II. Direct continuation of Elementary Hebrew 101 with emphasis on enhancing reading, writing, and speaking skills. Same as JST 103. (Spring)

103. Intermediate Hebrew. Continuation of HEB 102 with emphasis on enhancing reading comprehension and writing and speaking skills. Students are expected to have good understanding of the structure of Hebrew including familiarity with verb forms. Same as JST 104. (Fall)

204. Hebrew through Conversation. A conversational course designed to offer the opportunity to converse and discuss anything in Hebrew, from poetry to politics, depending on the interest of the class.

LATIN

101. Elementary Latin I. An introduction to the Latin language based on the ancient authors and designed to prepare students for the reading of classical and medieval texts. (Fall)

102. Elementary Latin II. Continuation of LAT 101. Prerequisite: LAT 101 or permission of instructor. (Spring)

103. Intermediate Latin. This course, the third in the introductory sequence, consists of readings from a selection of Latin prose and poetry with accompanying grammar review.

204. Catullus. A close study of the poems of Catullus.

206. Virgil’s Aeneid. A study of Books 1, 2, 4, 6 of Virgil’s Aeneid, concentrating on translation and interpretation of the work.

207. Lucretius. Selections from Lucretius’ philosophical poetry.

210. Cicero. Study of a major oratorical work plus a sampling of the philosophy and letters.


213. Imperial Rome. Latin prose and poetry illustrating both the ideology and the day-to-day realities of the Roman Empire.


216. Roman Historians. Selections from the major Roman historians are read and discussed.

221. Medieval Latin. Introduction to a variety of Medieval Latin texts. Students complete independent studies of an author or topic of their choice.

250/450. Latin Skills. This course focuses on the development of listening, speaking, and writing skills for Latin students and prospective teachers.

391. Independent Study. Advanced readings in unadapted Latin texts, by arrangement with the instructor.

393. Senior Thesis. (Spring)

CLASSICAL STUDIES

102. Cultural History of Ancient Greece. In this course students survey the unique military, political, and economic history of ancient Greece from the Bronze Age to the death of Alexander the Great.

135. Classical Mythology. Introduction to the major myths of the Greek gods and heroes using readings in translation and slides of Greek art. Same as REL 135.

140. Classical and Scriptural Backgrounds. Same as REL 140 and ENG 140.

142. The Ideas of the Greeks. A study of the major literary, philosophical, religious, and historical themes, and ideas from Homer to Aristotle.

193Q. 1. Claudius: Introduction to Imperial Rome. Roman social history, using the I. Claudius videos as a starting point. Readings include primary sources, modern scholarship, historical fiction. Same as REL 205.

199Q. The Infinite. A detailed examination of the concept of the infinite in Western thought (Greek philosophy, biblical theology, romantic literature, and modern and ancient mathematics).

200. Introduction to Archaeology. An examination of the methods and theoretical approaches of archaeology.

201. Archaeology of Comparative Colonization. A comparative investigation of material culture and patterns of colonization in the ancient Mediterranean and early America. Same as HIS 224.


205. 1. Claudius: Introduction to Imperial Rome. Same as CLA 193Q and REL 205.


212. Roman Structures: The Roman Social World. Explores the social, political, religious, family, and household structures that gave rise to the great physical structures of the Romans.
213. **Roman Structures: Engineering in the Classical World.** A study on location of Roman engineering focused primarily on civil engineering structures, but also including topics in mechanics, hydraulics, and materials. Same as ME 105.

389. **Junior/Senior Seminar.** A seminar in which advanced students in classics design and present their own research projects; particular attention paid to methods of research and interpretation.

## RUSSIAN STUDIES

Kathleen Parthé, Ph.D. (Cornell)  **Professor of Russian; Director of Russian Studies**

John Givens, Ph.D. (University of Washington)  **Associate Professor of Russian**

Matthew Lenoe, Ph.D. (Chicago)  **Associate Professor of History**

Randall Stone, Ph.D. (Harvard)  **Associate Professor of Political Science**

Friederike Seligman, Ph.D. (Michigan)  **Assistant Professor of Russian**

Laura Givens, M.A. (University of Washington)  **Senior Lecturer in Russian**

Anna Maslennikova, Ph.D. (St. Petersburg)  **Senior Lecturer in Russian**

Russian studies offers students a program that incorporates the perspective of several disciplines and the linguistic, historical, and cultural background needed to understand Russia’s past, to analyze its present, and to make responsible predictions about its future. The three departments and disciplines providing the core faculty for this program are modern languages and cultures, history, and political science, but a Russian studies major or minor concentration includes courses in or cross-listed with art history, religion and classics, Judaic studies, Polish and Central European studies, film and media studies, women’s studies, comparative literature, and economics.

The Russian studies curriculum, like Russia itself, is seen as a work in progress, and new courses are added and old ones revised to reflect new knowledge in this area, and the changing opportunities for graduates of the program. Recent additions to the roster of courses include Russia Now, The Politics of Identity, Secret Nation, Russian Art, Russia Goes to the Movies, and Russia and Eastern Europe. There are numerous co-curricular activities throughout the year designed to meet the needs and interests of majors and minors, but open to the entire College community.

In addition to the course of study on the Rochester campus, students majoring or minoring in Russian studies take part in the one-month summer program in St. Petersburg, or an approved semester-long program in Moscow or St. Petersburg. Each year students are involved in area-related summer or semester internships in Washington, D.C., or Russia. Graduates have gone on to law school and other postgraduate study, to positions in nongovernment and government agencies in Washington, and to U.S. businesses with branches in Moscow and St. Petersburg.

Russia has a history and culture that go back more than a millenium, while its democracy and emerging market economy are less than two decades old. The Russian studies program prepares students to not only know about this area, but to work in and with it at this time of transition.

In addition to the Russian studies major and minor, the program also offers clusters in the humanities and one in the social sciences, and several of its courses count towards the Certificate in International Relations. For further information on the Russian major and minor requirements, and on the summer study program in St. Petersburg, consult the Department of Modern Languages and Cultures section in this catalog.

The Russian studies major is an interdisciplinary program designed to provide students with a background in Russia, the former Soviet Union, and Central and Eastern Europe. The course of study is based on a working knowledge of the Russian language, combined with the study of Russian history, literature, film, religion, art, political science, and economics. Successfully completing a major enables students to do independent analysis of events in Russia and surrounding regions.

A major in Russian studies can be designated as belonging either to the humanities or social sciences, depending on the student’s interests and course choices. Students frequently combine a Russian studies major with a second major in political science, history, or another discipline.

### REQUIREMENTS FOR CONCENTRATION IN RUSSIAN STUDIES

1. Proficiency in Russian, which can be demonstrated in several ways, but which is generally the equivalent of coursework through 152.

2. Two courses in Russian literature and two in Russian history; it is highly recommended that at least one of the literature and one of the history courses be a survey.

3. Two courses in political science which teach basic concepts of international relations or have a specific focus in this area.


5. Upper-level writing requirement: majors take the writing section of two Russian studies courses or one such course plus the senior thesis.

Language training in Russia is strongly encouraged, either through the University of Rochester’s summer program in St. Petersburg, or one of several recommended semester-long programs.

### REQUIREMENTS FOR MINOR IN RUSSIAN STUDIES

The minor in Russian studies can be designated as belonging either to the humanities or social sciences, depending on the student’s interests and course choices.

The minor requires a reading knowledge of Russian (151 or the equivalent) plus five courses: (a) a survey course in history/culture, and a survey in literature (for a total of two courses); (b) one course each in a more specialized area of history, literature, or art (two courses in all); and (c) a course in political science or economics which enriches the study of this region.

### COURSES OF INSTRUCTION

In addition to Russian language at all levels, the Russian Studies Program regularly offers the following courses in English. Fuller descriptions are available in the entries for the Departments of History, Modern Languages and Cultures, and Political Science.

- **CLT 160.** The New Europe: Formations and Transformations.
- **CLT 161.** Europe Today.
- **HIS 151.** Imperial Russia.
- **HIS 152.** Soviet Russia.
- **HIS 191.** Russian Revolution.
- **HIS 293.** Stalinism.
- **HIS 330.** Russia in East Asia.
- **PSC 106.** Introduction to International Relations.
- **PSC 271.** Russia and Eastern Europe.
- **PSC 272.** Theories of International Relations.
- **PSC 292.** Politics and Economics of Post-Communist Transformation.
- **RUS 124.** Russian Life.
- **RST 126.** Russia Now. Same as HIS 154.
- **RUS 128.** Russian Civilization. Same as HIS 150.
- **RUS 190Q.** Tolstoy’s War and Peace. Same as RUS 235.
- **RUS 224.** Russian Art.
- **RUS 229.** St. Petersburg in Russian Culture.
- **RUS 231.** Great Russian Writers (1830–1930).
- **RUS 237.** Dostoevsky. Same as RUS 191Q.
- **RUS 243.** Chekhov and His Contemporaries.
- **RUS 246.** The Image of Christ in Russian Literature.
- **RUS 247.** Secret Nation.
- **RUS 248.** Politics of Identity.
- **RUS 267.** Russia Goes to the Movies.
- **RUS 289.** Dangerous Texts: Literature and Politics in Russia. Same as HIS 243.
SOCIOLoGY

Dean Harper, Ph.D. (Columbia) Professor of Sociology and Associate Professor of Psychiatry
Thomas Spence Smith, Ph.D. (Chicago) Professor of Sociology
Raymond Murphy, Ph.D. (Northwestern) Professor Emeritus of Sociology

Though the College offers several courses in sociology each year, there is no Department of Sociology, and therefore no major, or minor, in sociology. Students who are particularly interested in sociology, and do not wish to major in one of the departmental programs in the College, are encouraged to arrange an interdisciplinary major through the College Center for Study Abroad and Interdepartmental Degree Programs (see page 77). Through the Center a program including an emphasis on sociology may be submitted for the approval of the Committee on Individualized Interdepartmental Concentrations. Students who plan on graduate study in sociology should consult one or more of the professors of sociology for advice concerning appropriate undergraduate courses, both in sociology and in other departments.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

INTRODUCTORY COURSES


SOCIOLOGICAL THEORY


SPECIALIZED COURSES

221. Love, Friendship, and Community. Sociological study of personal ties and face-to-face social groups: kinship networks, friendship groups, political and religious ideological groups, intellectual circles.


SEMINARS AND READING AND RESEARCH COURSES

391. Independent Study in Sociology. Special work individually assigned, with the consent of the department.

392. Directed Research. Individual research projects, done under the supervision of a faculty member.

394. Internship.

STATISTICS

Govind Shrikirshna Mudholkar, Ph.D. (North Carolina) Professor of Statistics in the Department of Mathematics
Poduri, S.R.S. Rao, Ph.D. (Harvard) Professor of Statistics in the Department of Mathematics; Director of the Program in Statistics
Charles Heckler, Ph.D. (Rochester) Adjunct Associate Professor in Statistics
Maria McDermott, M.A. (Rochester) Adjunct Instructor in Statistics
Nicholas Zaino, M.A. (Rochester) Adjunct Instructor in Statistics

The major and minor in statistics will be available to students on a case by case basis depending on course availability. For further information, please contact Professor S.R.S. Rao Poduri, Director of the Program in Statistics.

Introduction to statistical methods and applications is provided by STT 211, 212, or 213; to probability by STT 201; and to statistical theory and inference by STT 203. STT 216 is an intermediate-level course in applied statistics. Computer software packages are integrated into the applied and some of the advanced courses.

REQUIREMENTS FOR STATISTICS MAJORS

1. MTH 161 and 162 or their equivalents (141–145).
2. Ten additional courses:
   a. Six to eight statistics courses, including STT 212 or 213 (or 211), 201, 205, and 226W.
   b. Two to four courses in an allied field, such as computer science, economics, mathematics, political science, and psychology.
   c. In addition: CSC 108 or 171, or EE 171, or STT 277–278, or equivalent.

DOUBLE MAJORS

The above requirements are also needed for the double majors—statistics and another field such as economics, mathematics, political science, and psychology. Approvals of both the departments are required. Not more than three courses can be duplicated for the two majors.

JOINT CONCENTRATION IN MATHEMATICS AND STATISTICS

MTH 161, 162, 164, 165, and 235 (or 173);
MTH or STT 201, 202, 203, and 208; STT 226W;
two additional 200-level courses in mathematics and/or statistics; CSC 108 or 171, or EE 171, or STT 277–278, or equivalent. Approvals of the advisors in both the programs are required.

REQUIREMENTS FOR A MINOR IN STATISTICS

A total of five courses is required:
1. STT 201.
2. STT 203.
3. STT 211 or 212 (or 213).
4. At least one of the following: STT 216; STT 226W.
5. At least one elective from the offerings of the program or computing courses, such as CSC 108 or 171, or EE 171, or STT 277–278, approved by the statistics program advisor.

UPPER-LEVEL WRITING REQUIREMENT

Statistics majors: STT 226W and STT 221W; STT 216 with a project may be substituted for one of these courses.

Joint mathematics/statistics majors: an MTH xxeW course may be substituted for one of the above courses.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

201. Introduction to Probability. Probability spaces, combinatorial problems, random variables and expectations, discrete and continuous distributions, generating functions, independence and dependence, binomial, normal, and Poisson laws, laws of large numbers. Prerequisite: MTH 143 or 162. Same as MTH 201.


211. Applied Statistics for the Social Sciences I. Descriptive statistics, statistical analysis, and statistical inference as used in the social sciences; including elements of correlation, regression, and analysis of variance. Excel, Minitab, and similar programs.

212. Applied Statistics for the Biological and Physical Sciences I. Descriptive statistics, statistical analysis, and statistical inference as used in the biological and physical sciences; including elements of correlation, regression, and analysis of variance. Excel, Minitab, and similar programs.

213. Elements of Probability and Statistics. Probability, probability distributions, random variables, moments, principles of statistical inference, estimation, hypothesis testing. Prerequisite: MTH 141 or equivalent.

216. Applied Statistics II. Continuation of 211 or 212. Analysis of variance, regression, correlation contingency table analysis, and associated topics. Prerequisite: STT 211 or 212. Excel, Minitab, and similar programs.

211W. Sampling Techniques. Simple random, stratified, systematic, and cluster sampling; estimation of the means, proportions, variance, and ratios of a finite population. Ratio and regression methods of estimation and the use of auxiliary information. The nonresponse problem. Prerequisites: STT 211, 212, or 213, and familiarity with the concepts of expectation, variance, covariance, and correlation. STT 203 would be helpful.

222. Design of Experiments. Randomized blocks and Latin squares, one- and two-way classifications, factorial experiments, analysis of variance and covariance, t-tests and F-tests. Excel, Minitab, and JMP and SAS, and similar programs.

226W. Introduction to Linear Models. Simple linear, multiple, and polynomial regression methods and applications; ordinary and generalized least squares, estimation, tests of hypotheses and confidence intervals, and simultaneous inference, and computer packages. Computer programs including JMP and SAS. Prerequisites: STT 165 or 212, and STT 205.


277. Computing: Introduction to Statistical Software. Credit—2 hours. Introduction to the MINITAB, SAS, and S programming environments. Some general theoretical and practical topics in computing also presented. Individual projects on some advanced topics. Prerequisites: STT 212 and either STT 216 or STT 220W. (Course offered first half of semester)

278. Methods of Data Analysis. Credit—2 hours. Philosophy and techniques of exploratory data analysis. Each student analyzes a single real-life data set in some depth using S and discusses his or her work with the class. Extra instruction in S as needed. Prerequisite: STT 277. (Course offered second half of semester.)

390. Supervised College Teaching.

391. Independent Study in Statistics. Supervised reading arranged on an individual basis. Prerequisite: consent of the department.

394. Internship. Arranged by the student and supervised by the advisor.

In addition, some 400-level courses are available to qualified undergraduates through the Department of Biostatistics.

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**VISUAL SCIENCE**

Richard N. Aslin, Ph.D. (Minnesota) William R. Kavan Professor of Brain and Cognitive Sciences, Professor of Psychology and in the Center for Visual Science; Director, Center for Brain Imaging

Greg DeAngelis, Ph.D. (California, Berkeley) Professor of Brain and Cognitive Sciences, of Neurobiology and Anatomy, of Biomedical Engineering, and in the Center for Visual Science

Charles J. Duffy, Ph.D. (Johns Hopkins) Professor of Neurology, of Neurobiology and Anatomy, of Biomedical Engineering, and in the Center for Visual Science

Steven Feldon, M.D. (Albert Einstein College of Medicine) Professor of Ophthalmology, of Neurology, and in the Center for Visual Science; Chair of the Department of Ophthalmology

James Fiengrub, Ph.D. (Stanford) Robert E. Hopkins Professor of Optics and Professor in the Center for Visual Science

James R. Isen, Ph.D. (Michigan) Professor of Brain and Cognitive Sciences, of Psychology, and in the Center for Visual Science

Robert A. Jacobs, Ph.D. (Massachusetts, Amherst) Professor of Brain and Cognitive Sciences, of Psychology, of Computer Science, and in the Center for Visual Science

David Knill, Ph.D. (Brown) Professor of Brain and Cognitive Sciences and in the Center for Visual Science; Associate Director of the Center for Visual Science

Peter Lennie, Ph.D. (Cambridge) Robert L. and Mary L. Sproull Dean of the Faculty of the College of Arts, Sciences, and Engineering; Professor of Brain and Cognitive Sciences and in the Center for Visual Science

Scott M. MacRae, M.D. (Wisconsin) Professor of Ophthalmology and in the Center for Visual Science

Walter Makous, Ph.D. (Brown) Professor of Brain and Cognitive Sciences, of Psychology, of Ophthalmology, and in the Center for Visual Science

William R. Merigan, Ph.D. (Maryland) Professor of Ophthalmology, of Environmental Medicine, of Brain and Cognitive Sciences, and in the Center for Visual Science

Gary D. Paige, M.D. (Chicago) Kilian J. and Caroline F. Schmit Professor of Neurobiology and Anatomy, Professor of Biomedical Engineering, of Ophthalmology, of Brain and Cognitive Sciences, and in the Center for Visual Science

Tatiana Pasternak, Ph.D. (Copenhagen) Professor of Neurobiology and Anatomy, of Brain and Cognitive Sciences, and in the Center for Visual Science

Marc H. Schieber, M.D. (Washington) Professor of Neurology, of Neurobiology and Anatomy, of Physical Medicine and Rehabilitation, of Brain and Cognitive Sciences, and in the Center for Visual Science

David R. Williams, Ph.D. (California, San Diego) William G. Allyn Professor of Medical Optics, Professor of Brain and Cognitive Sciences, of Psychology, of Optics, of Ophthalmology, of Biomedical Engineering, and in the Center for Visual Science; Director of the Center for Visual Science

Daphne Bavelier, Ph.D. (M.I.T.) Associate Professor of Brain and Cognitive Sciences, of Radiology, and in the Center for Visual Science

Edward Freedman, Ph.D. (Pennsylvania) Associate Professor of Neurobiology and Anatomy and in the Center for Visual Science

Lin Gan, Ph.D. (University of Texas) Associate Professor of Ophthalmology, of Center for Aging and Developmental Biology and in the Center for Visual Science

Alexandre Pouget, Ph.D. (California, San Diego) Associate Professor of Brain and Cognitive Sciences, of Biomedical Engineering, and in the Center for Visual Science

Michael Weisk, Ph.D. (California, Berkeley) Associate Professor of Brain and Cognitive Sciences and in the Center for Visual Science

Krystel Huslin, Ph.D. (University of Sydney) Assistant Professor of Ophthalmology and in the Center for Visual Science

Richard Libby, Ph.D. (Boston) Assistant Professor of Ophthalmology and in the Center for Visual Science

Ania Majewska, Ph.D. (Columbia) Assistant Professor of Neurobiology and Anatomy and in the Center for Visual Science
Lizabeth Romanski, Ph.D. (Cornell)  Assistant Professor of Neurobiology and Anatomy and in the Center for Visual Science
Scott Seidman, Ph.D. (Case Western)  Assistant Professor of Sensory Motor Neurology and in the Center for Visual Science
Geunyoung Yoon, Ph.D. (Osaka University)  Assistant Professor of Ophthalmology, of Biomedical Engineering, and in the Center for Visual Science

Teaching assistants occasionally assist instructors in the courses offered in the Center, primarily in large courses or those requiring laboratories or numerous demonstrations.

The Center for Visual Science (CVS) fosters research on how the eye and brain allow us to see. CVS brings together a large number of faculty with ties to the departments of brain and cognitive sciences, ophthalmology, optics, neurobiology and anatomy, and neurology. Our interdisciplinary group provides an unusual opportunity for students to experience the frontiers of research on the visual system and brain function. To make these opportunities more accessible to undergraduates, we offer both a minor and a research minor in visual science. The minor emphasizes coursework while the research minor emphasizes hands-on experience in a modern vision laboratory. Either of these minors may be of interest to undergraduates who choose to concentrate in any of a number of other disciplines. The most natural and valuable combinations might link a visual science minor with a concentration in computer science, neuroscience, optics, or brain and cognitive sciences although other combinations are possible.

REQUIREMENTS FOR A MINOR IN VISUAL SCIENCE

Five courses are required.
1. One of the following:
   • CVS 110/BCS 110. Neural Foundations of Behavior
   • CVS 111/BCS 111. Foundations of Cognitive Science
   • CVS 153/BCS 153. Cognition
   • BCS 240/NSC 201. Basic Neurobiology

2. CVS 151/BCS 151. Perception and Action

3. CVS 208/BCS 208. Laboratory in Perception and Cognition

4. One of the following upper-level courses:
   • CVS 220/BCS 220. The Intelligent Eye
   • CVS 228/BCS 228. The Human-Machine Interface
   • CVS 245/BCS 245. Sensory and Motor Neuroscience
   • CVS 504/BCS 504. Sensory Systems (with permission of instructor)
   • CVS 505/BCS 505. Perception and Motor Systems (with permission of instructor)

5. CVS 391 or CVS 395. Independent Study/Independent Research in Visual Science

REQUIREMENTS FOR A RESEARCH MINOR IN VISUAL SCIENCE

Five courses are required.
1. CVS 151/BCS 151. Perception and Action
2. CVS 208/BCS 208. Laboratory in Perception and Cognition
3. CVS 389. Vision Science Research Colloquium
4. Two semesters of CVS 395. Independent Research in Visual Science. These may be either with the same faculty member in CVS or with two different faculty.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

110. Neural Foundations of Behavior. Introduces the structure and organization of the brain, and its role in perception, movement, thinking, and other behavior. Topics include the brain as a special kind of computer, localization of function, effects of brain damage and disorders, differences between human and animal brains, sex differences, perception and control of movement, sleep, regulation of body states and emotions, and development and aging. No prerequisites. Same as BCS 110. (Fall)

151. Perception and Action. Explores how the biology of our senses shapes perceptual experiences of reality. Emphasizes sense of sight primarily and hearing secondarily. An important theme is that our sensory systems play a crucial role in the execution of coordinated movements of our bodies, as we navigate in, and interact with, the environment. Prerequisite: BCS/CVS 110 or BCS/CVS 111, or equivalent background. Same as BCS 151. (Fall)

208. Laboratory in Perception and Cognition. Introduces observational studies of perceptual and cognitive phenomena, showing how scientific questions can be answered by making such observations. Students perform, analyze, interpret, and report results from seven experiments conducted in a sequence that gradually increases the independence of the student experimenters. Prerequisites: BCS 200 and either CVS 151 or 153. (Spring)

220. The Intelligent Eye. Provides an interdisciplinary view of modern research into how the human brain solves the problems involved in perception, including how we perceive the three-dimensional structure of the world, how we recognize objects, and how visual information is used to control action in the world. Students read contemporary research and, through classroom discussion and critical essays, explore and analyze the questions and debates that define contemporary perceptual science. Prerequisite: CVS 151. Same as BCS 220. (Spring)

228. The Human-Machine Interface. Surveys the factors that influence human performance with machines and other artificial systems, including sensory and motor function, information processing, memory, motivation, decision making, problem solving, the influence of the environment, and facilitators such as instructions, performance aids, selection, and training. Includes in-depth consideration of visual displays and motor input. No prerequisites. Same as BCS 228. (Spring)

245. Sensory and Motor Neuroscience. Provides an overview of the neural basis of perception and action, covering vision, audition, somatosensation, chemical senses, eye movements, and reaching. Topics include a review of sensory transduction, how the brain extracts information from sensory signals, how muscles convert nerve impulses into mechanical forces, how different movements are encoded in the brain, and how an animal’s internal state (e.g., memory or attention) influences the course of action. Prerequisite: BCS 240 (NSC 201) or equivalent background with instructor’s permission. (Spring)

389. Vision Science Research Colloquium. Intended for students who are engaged in research in the Center for Visual Science and who may be considering a career in research. Provides exposure to the research environment of the Center through the regular research meetings and colloquia attended by CVS graduate students, postdocs, and faculty. Students also complete a paper on a vision-related topic. No prerequisites. (Fall and Spring)

391. Independent Study. A special program of reading in advanced aspects of visual science. Designed by individual arrangement with a faculty member in the Center for Visual Science. (Fall and Spring)

395. Independent Research. A research course designed by individual arrangement with a faculty member. Complete descriptions of Faculty Research Programs can be found on the Web (www.cvs.rochester.edu) or obtained from the department’s Undergraduate Programs Office (102 Meliora). (Fall and Spring)
WOMEN’S STUDIES

Women’s studies offers an interdisciplinary concentration leading to a bachelor’s degree, supervised by the program’s Curriculum Committee. A minor in women’s studies is also available.

STEERING COMMITTEE

Susan Gustafson, Ph.D. (Stanford) Karl F and Bertha A. Fuchs Professor of German Studies and Professor of German; Director of the Susan B. Anthony Institute for Gender and Women’s Studies

Terry Platt, Ph.D. (Harvard) Professor of Biology and Adjunct Professor of Biochemistry and Biophysics

Sharon Willis, Ph.D. (Cornell) Professor of French and of Visual and Cultural Studies

Ayla Emmett, Ph.D. (Rochester) Associate Professor of Anthropology

Larry Hudson, Ph.D. (Keele) Associate Professor of History

Jean Pedersen, Ph.D. (Chicago) Associate Professor of Humanities in the Eastman School of Music and of History in the College

Women’s studies focuses on the experiences of diverse groups of women and the changing cultural, economic, political, and psychological relations among women and men. Because women’s studies asks questions about women and about gender that no single academic department is able to answer, the program encourages an interdisciplinary approach to research and learning.

The program offers an undergraduate major and minor, an honors program, clusters in the humanities and social sciences, and internships in the Rochester community. Students have the opportunity to work from faculty in the humanities, sciences, and social sciences, who are appointed in the College (arts and sciences), the Eastman School of Music, the Margaret Warner Graduate School of Education and Human Development, the School of Nursing, and the School of Medicine and Dentistry.

In the early 1980s the University opened the program in women’s studies to address issues important for understanding the role of women. The Susan B. Anthony Institute for Gender and Women’s Studies is named to honor Susan B. Anthony, the nineteenth-century suffragist who led a successful campaign to have women admitted to the University of Rochester in 1900. The Institute draws on Anthony’s goals and ideals and preserves her rich historical connection with the city of Rochester.

In addition to the undergraduate curricular program, other programs include undergraduate student conference, undergraduate student workshop with visiting scholars, graduate certificates, graduate fellowships, faculty research seminars, public lecture series, and conferences.

REQUIREMENTS FOR CONCENTRATION IN WOMEN’S STUDIES

The interdepartmental major in women’s studies requires 12 courses (8 in women’s studies): WST 200W (Colloquium); three from among the remaining foundation courses (WST 201–209); three electives in women’s studies (from courses cross-listed in at least two departments), either an internship, independent research project, or women’s studies seminar; and four allied field courses that constitute a coherent field of study (at least two in a single department or program, the remaining two in any department or program, including women’s studies).

HONORS IN RESEARCH

Majors who are carrying a women’s studies GPA of 3.5 or better and who have successfully completed at least one 300-level course (4 credit hours) in women’s studies by the end of their junior year are eligible to work for honors in women’s studies in their senior year. In the senior year, the honors sequence combines independent research (WST 393H) or an internship (WST 394H) in the fall with the production of an honors thesis (WST 397H) in the spring.

REQUIREMENTS FOR A MINOR IN WOMEN’S STUDIES

Two foundation courses (WST 200–209), three electives. No more than two courses included in the student’s major may be counted toward the minor.

CLUSTERS

Social Sciences

Gender and History
Gender and Public Policy
Gender and Social Issues
Gender, Science, and Health
History and Theory of Feminism

Humanities

Gender and Literature
Gender, Culture, and Representation
Race and Gender

UPPER-LEVEL WRITING REQUIREMENT

We require that all women’s studies majors successfully complete two upper-level writing courses:

1. WST 200W. Women’s Studies Colloquium
2. ONE of the following courses:
   a. WST 391, Independent Study, provided that it requires substantial research, writing, and revision
   b. WST 396, Women’s Studies Seminar, as a writing course, by arrangement with the instructor
   c. Majors who are minoring in another program or department may take an upper-level writing course in their minor
   d. Double majors may take an upper-level writing course in their second major, provided that it is taken in addition to the writing courses required for that major

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

FOUNDATION COURSES

200W. Colloquium in Women’s Studies.
201. Women in History.
203. Women in Politics.
204. Feminism in Literature, Art, and Media.
205. Philosophical Foundations of Feminism.
206. Psychology and Women.
207. Feminism in Science and Technology.
208. Women and Ethnicity.

ELECTIVES

391. Independent Study. (Reading course in gender and women’s studies.)
393. Independent Research. Students design their own research project based on an area of scholarly exploration within gender and women’s studies. The student is expected to use the material from previous coursework.
393H. Independent Research—Honors.
394. Internship in Women’s Studies. Students receive experience and course credit by working with local Rochester organizations in the arts, education, health, law, media, politics, and social services. These internships focus on gender and women’s studies.
394H. Internship—Honors.
396. Seminar in Women’s Studies. Examines from a multidisciplinary perspective a particular topic related to gender and women’s studies. Provides in-depth research opportunities.
The following list gives a general indication of sample elective courses offered in women’s studies:

100. Introduction to Women’s Studies.
123. Introduction to Visual and Cultural Studies.
194Q. Masculine Discontent in Film and Society.
195Q. Outlaw Heroes: Robin Hood to Eastwood.
206. Feminism, Gender and Health.
214. Women as Text and Image.
219. Families, Households, and Gender.
220. Urban Schools: Race and Gender.
225. Women, Cloth and Culture.
235. Contemporary Women’s Writing.
243. The Brontës.
260. Race and Gender in Popular Films.
271. Sex and Gender.
331. Black Males and Culture.
334. History of Ideas: Alien Sex.
351. Approaches to Women in History.

Further information is available from the Susan B. Anthony Institute for Gender and Women’s Studies, 538 Lattimore Hall, University of Rochester, P.O. Box 270434, Rochester, New York 14627-0434. Phone: (585) 275-8318. Fax: (585) 461-9576. Web: www.rochester.edu/college/wst.
makes it possible to incorporate specialized coursework. For instance, engineering students can pursue elective work and undertake research projects in such fields as architecture, environmental studies, and materials science.

In their first year, enrolled students who have expressed an interest in an engineering concentration are assigned engineering faculty advisors who counsel interested students on the School’s degree requirements, policies, and procedures. Students formally enter the School at the end of their sophomore year or at any time in their undergraduate tenure that they have satisfied the necessary prerequisites.

Four-year courses of study lead to the Bachelor of Arts (engineering science), the Bachelor of Science degree in biomedical engineering, chemical engineering, electrical and computer engineering, geomechanics, mechanical engineering, optics, or an interdepartmental program in engineering and applied science. The Bachelor of Science degree programs in chemical, biomedical, electrical and computer, and mechanical engineering are accredited by the Accreditation Board for Engineering and Technology; seniors in these programs are eligible to take the “Fundamentals of Engineering Examination,” and are encouraged to do so. This is the first of two examinations leading to professional licensure. See pages 138–157 for details about these programs.

BACHELOR OF ARTS IN ENGINEERING SCIENCE

Another option for students, especially those who are uncertain about their intended specialization or are interested in a broad introduction to several fields of engineering, is the B.A. (engineering science). This program provides a strong, technological education for students considering careers in law, medicine, or business, or wishing to delay engineering specialization to the graduate level. The underlying science and mathematics requirements are similar to those needed for most science and engineering concentrations. The other requirements are the same as those prescribed for liberal arts degrees. As a result, the decision on a wide variety of possible course selections can be made at the beginning of the junior year, later than the usual timing for prospective B.S. (engineering) students. (See page 157 for more details.)

REQUIREMENTS FOR THE DEGREE BACHELOR OF SCIENCE

In addition to the specific courses stipulated in the degree programs, students must satisfactorily complete the following:

1. Semester hour requirements: The Department of Biomedical Engineering requires a minimum of 130 semester hours; the Department of Chemical Engineering, 130; the Department of Electrical and Computer Engineering, 128; the Department of Mechanical Engineering, 129; and The Institute of Optics, 130.

2. Writing: Entering students are advised by the College Writing Center in the selection of an appropriate primary writing course. Students should complete this requirement by the end of their first year. The ability to communicate clearly and effectively is extremely important. Each department and program has incorporated a discipline-specific upper-level writing experience into the curriculum, as described in the Bulletin sections of each program. Every student must complete the upper-level writing requirements of their degree program.

3. Cluster requirements: Clusters in the areas of humanities and social sciences are an important and integral part of an engineering education, and should be carefully chosen with the help of faculty advisors. Students in Bachelor of Science degree programs in biomedical, chemical, electrical and computer, or mechanical engineering are required to complete one cluster in either the humanities or social sciences and an additional one or two humanities or social science courses for distribution requirements. Students completing the Bachelor of Science degree programs in optics, geomechanics, or the interdepartmental program, or the Bachelor of Arts in engineering science, are required to complete two clusters, one each in the humanities and social sciences.

Another way of fulfilling cluster and distribution requirements is to choose a minor...
from the offerings within the humanities or social science areas (which still requires a total of five or six courses from these areas). Refer to individual department or program sections in this Bulletin for further details.

4. Distribution requirements: Engineering students must take four to six humanities and/or social sciences courses depending on their department’s policy. For ABET-accredited degree programs, three of these courses must constitute an approved humanities/social sciences cluster (regardless of the classification of the individual courses that make up the cluster). The remaining one or two courses must be classified by the College as humanities and/or social sciences courses and must not emphasize basic skills in mathematics or computer programming.

5. Residency requirement: The intent of the residency requirement is to ensure that graduates have taken a substantial number of the advanced courses required for their concentration in a timely fashion at the University of Rochester. To qualify for an undergraduate degree, a student must complete at least four semesters of full-time study, or, for part-time students, the equivalent number of credit hours.

6. Cumulative grade-point average: an average of at least 2.0 for all courses taken for credit at the University of Rochester, and an average of at least 2.0 in courses specified by the department or program of concentration.

7. All students accepted into the School of Engineering and Applied Sciences become responsible for two full years of equipment fees. These are normally assessed during each semester of the junior and senior years.

FLEXIBLE FIRST YEAR
Students intending to pursue an engineering program are accepted into the College in their first year and are assigned an advisor from the engineering faculty. The typical first-year schedule is shown below.

| MTH 161  | Natural science course |
| Engineering recommendation  | Humanities or social sciences elective |

Students choose their engineering electives in consultation with their faculty advisor. First-year students who have chosen a major field should take the courses recommended for that concentration as indicated under specific departmental listings. Other students may use the engineering electives to explore options within the engineering fields. It is not necessary to select a major field until the end of the first year because appropriate engineering courses taken in the first year can be used as electives in each program—all required courses can be taken in the last three years.

Students may transfer into the School of Engineering and Applied Sciences at the University of Rochester at any time, but will find it necessary to satisfy those prerequisites they may be lacking.

MINORS
The School of Engineering and Applied Sciences recognizes all minors offered by the College. In addition, the School of Engineering and Applied Sciences offers minors in bioenvironmental engineering, biomedical engineering, chemical engineering, electrical and computer engineering, environmental engineering, materials science, mechanical engineering, and optics. These minors are available to all undergraduates as a way to strengthen their academic program.

ORT BRAUDE COLLEGE EXCHANGE PROGRAM
The College is pleased to offer a unique and innovative English-language study abroad program at the ORT Braude College in Karmiel, Israel, designed specifically for University of Rochester students of science and engineering. The program specifically meets the needs of sophomores considering majoring in mechanical, chemical, electrical and computer, and biomedical engineering, and chemistry, physics, and computer science. Some juniors (for example, Take Five students) may be eligible.

While on the program, students live in the ORT Braude residence halls. An inexpensive cafeteria, sports facilities, extracurricular activities, and many social functions are available on campus. Each Rochester student has a local student mentor. Students have the opportunity to learn Hebrew on the program, and to take Introduction to the History and Archaeology of the Galilee as well. Students may also choose to stay in Israel for the summer on the 8-credit summer archaeological dig in the Galilee, a University of Rochester summer study abroad program.

This is a spring-only program. Approximate dates are March 1 through July 5, with a one-week break during the Israeli Passover vacation. All courses are taught in English. The application deadline is October 15. Additional information is available at the Center for Study Abroad and Interdepartmental Programs, 206 Lattimore Hall, and on the Web at www.seas.rochester.edu/SEAS/options/ORt-Braude.html.

INDUSTRY PRACTICUM
When looking for employment, students have discovered that employers increasingly demand significant practical work experience in addition to sound academic knowledge. The optional Industry Practicum provides an opportunity for students to enhance their education by integrating their engineering and computer science knowledge with workplace practice. Students intending to pursue an engineering or computer science degree are encouraged to participate in the School’s Industry Practicum, a paid, full-time, high-quality work experience over an eight-month period.

To participate, a student must be a second-semester junior or a first-semester senior and be pursuing a degree in any engineering discipline or computer science. During the eight-month Industry Practicum, students do not take any classes, receive any academic credit, or pay tuition. As a result, it is important for students to meet with their faculty advisors to plan their potential participation in the Industry Practicum to ensure that they meet departmental requirements. Advisors assist students in curriculum planning since four-and-a-half-year’s time will be necessary to complete the usual four-year academic program.

Additional information on this program can be obtained from the School’s Deans Office, 306 Lattimore Hall, or from the Career Center, Meliora Hall.

TAKE FIVE SCHOLARS PROGRAM
Students may extend undergraduate work beyond the normal four-year period to include additional courses related to their interests by applying to the Take Five Scholars Program. If accepted, students may elect an additional semester or an extra year without tuition charges. Students wishing to apply for the Take Five Scholars Program should consult their faculty advisors.

KAUFFMAN ENTREPRENEURIAL YEAR (KEY) PROGRAM
The KEY program also provides an opportunity for students to spend a fifth year at the University. Students who participate in this program study or practice entrepreneurship through internships, special projects, business plan development, and research into various facets of entrepreneurship or analysis of how culture and public policy influence entrepreneurial activity.

DOUBLE DEGREES
Students may earn both a B.S. degree in the School of Engineering and Applied Sciences and a B.A. or B.S. degree in a chosen liberal arts or science concentration. These students essentially complete a program similar to a two-college program, but do so entirely at the University of Rochester. Dual degrees require significant work beyond the normal requirements of a four-year program. Any extension past the normal four-year time span will not be tuition free.

Students may earn a B.A. in engineering science, with a second degree in any other program in the College. All degree requirements for both programs must be satisfied.

Students may earn two bachelor degrees from the School of Engineering and Applied Sciences; however, the interdepartmental B.S. program may not be one of the two degrees unless approved by the Administrative Committee.
B.S.-M.S. PROGRAMS

Combined B.S.-M.S. programs in biomedical engineering, chemical engineering, electrical engineering, materials science, mechanical engineering, and optics are available to those students wanting to blend their undergraduate program with graduate study.

Students who wish to complete a bachelor’s degree in engineering and a Master of Business Administration may be able to combine an undergraduate engineering program with work in the William E. Simon Graduate School of Business Administration. Because engineering program requirements exceed those of other undergraduate majors, the majority of engineering undergraduates will not be ready to take advantage of the application schedule followed by most University undergraduates from other disciplines. Therefore, the Simon School offers two additional options to accelerate the completion of both undergraduate and graduate degrees to eligible engineering students. (Engineering science majors are encouraged to arrange their programs to participate in the normal 3-2 program.)

Option 1 requires students to apply by November 15 of their senior year for admission to the M.B.A. program beginning in January. This option offers the student the full benefits of M.B.A. study insofar as the core courses are taken in sequence and the study-team approach is fully realized. Option 1 also offers the opportunity for students to take a summer internship, provided the student is willing to add the three courses normally taken during the summer quarter (one each) to the remaining three academic quarters of the second year of M.B.A. coursework.

Option 2 is designed for engineering students who will not complete required engineering courses by the end of the fall semester of their senior year. Students commence M.B.A. coursework on a part-time basis during the fall semester of their senior year. Although option 2 permits the completion of both the bachelor’s and master’s degrees in five years, it usually does not involve a summer internship nor does it offer the strong team experience and class bonding opportunities of option 1.

Both of these options may require that students take an overload, summer courses, or prerequisite coursework during the junior or senior year; students should also be aware that the Simon School operates on a quarter system calendar. Students must have solid academic records and must score well on the Graduate Management Admissions Test (GMAT), which should be taken by January of their junior year, to be considered for admission. (See page 165 for details about this program.)

TRANSFER PROGRAMS

Students with engineering interests may transfer into the School of Engineering and Applied Sciences from other institutions. If they have had the equivalent of the first two years of science, mathematics, and pre-engineering, such students may enter the School directly and complete their degree requirements in an additional two years. This common pattern is often described as a “2+2” program. Another pattern is for students with a science and mathematics background in a liberal arts college to transfer after three years and then concentrate on engineering courses in order to complete an engineering degree in two more years. Often, on completion of the five years the first institution will confer a B.A. degree at the same time a B.S. in engineering is awarded at Rochester. Transfer programs formalized in this way are “3-2” programs. There are established agreements on 2+2 and 3-2 programs with a few regional institutions. However, a number of students with these transfer characteristics are admitted to the School on an individual basis. Course equivalency and credit are determined for each case. See page 185 of this bulletin for more on transfer possibilities.

ACADEMIC INFORMATION AND ADVISING

The Dean’s Office in Lattimore Hall assists students with course changes, summer school approval, preparation for graduate and professional study, independent study and special courses, and academic petitions. For specific regulations on these and other aspects of program planning, turn to the Academic Services and Information section of this bulletin (pages 170–175).

The School of Engineering and Applied Sciences assigns faculty advisors to each known prospective engineering student in the first year to provide information about different engineering fields and to help students plan and review course schedules and degree programs. The Dean’s Office coordinates the advising process, and every attempt is made to match advisors with individual interests and needs.

All courses in the School are taught by full-time faculty members with professorial rank or by part-time faculty members with the rank of professor or lecturer. In courses that have more than 25 students, student teaching assistants may aid the professor in supervising laboratory sessions, running regularly scheduled problem sessions, or grading homework.

BIOMEDICAL ENGINEERING FACULTY

Laurel H. Carney, Ph.D. (Wisconsin)  Professor of Biomedical Engineering
Gregory DeAngelis, Ph.D. (California, Berkeley)  Professor of Brain and Cognitive Sciences, of Biomedical Engineering, of Neurobiology and Anatomy and in the Center for Visual Science
Richard E. Waugh, Ph.D. (Duke)  Professor of Biomedical Engineering, of Pharmacology and Physiology, of Biochemistry and Biophysics, and of Mechanical Engineering; Chair of the Department
Diane Dalecki, Ph.D. (Rochester)  Associate Professor of Biomedical Engineering and of Electrical and Computer Engineering; Director, Rochester Center for Biomedical Ultrasound
Michael King, Ph.D. (Notre Dame)  Associate Professor of Biomedical Engineering, of Chemical Engineering, and of Surgery
Amy L. Lerner, Ph.D. (Michigan)  Associate Professor of Biomedical Engineering and of Mechanical Engineering and in the Center for Musculoskeletal Research
Anne E. Luebke, Ph.D. (Johns Hopkins)  Associate Professor of Biomedical Engineering and of Neurobiology and Anatomy
James McGrath, Ph.D. (M.I.T.)  Associate Professor of Biomedical Engineering
Axel Wismüller, M.D. (Technical University of Munich, Germany)  Associate Professor of Biomedical Engineering and of Imaging Sciences
Hani Awad, Ph.D. (University of Cincinnati)  Assistant Professor of Biomedical Engineering and of Orthopaedics
Edward Brown III, Ph.D. (Cornell)  Assistant Professor of Biomedical Engineering
Kevin Davis, Ph.D. (Boston)  Assistant Professor of Biomedical Engineering and of Neurobiology and Anatomy
Gregory Gdowski, Ph.D. (Boston)  Assistant Professor of Biomedical Engineering and of Neurobiology and Anatomy
Mathews Jacob, Ph.D. (Swiss Federal Institute of Technology, Switzerland)  Assistant Professor of Biomedical Engineering, of Electrical and Computer Engineering, and of Imaging Sciences
Nicholas N. Kuzma, Ph.D. (Yale)  Assistant Professor of Biomedical Engineering and of Imaging Sciences
Stephen McAlavey, Ph.D. (Rochester)  Assistant Professor of Biomedical Engineering and of Electrical and Computer Engineering
David Pinto, Ph.D. (Pittsburgh)  Assistant Professor of Biomedical Engineering and of Neurobiology and Anatomy
Scott Seidman, Ph.D. (Case Western Reserve)  Assistant Professor of Biomedical Engineering, of Neurobiology and Anatomy, and in the Center for Visual Science

BIOMEDICAL ENGINEERING

For any questions or changes to the BME curriculum please contact the BME undergraduate coordinator at (585) 273-4754 or visit our Web site at www.bme.rochester.edu.
JOINT APPOINTMENTS WITH
BIOMEDICAL ENGINEERING

Alfred Clark, Jr., Ph.D. (M.I.T.) Professor of Mechanical Engineering, of Mathematics, and of Biomedical Engineering

Philippe M. Fauchet Ph.D. (Stanford) Distinguished Professor of Electrical and Computer Engineering, Professor of Materials Science, of Optics, and of Biomedical Engineering and Senior Scientist in the Laboratory for Laser Energetics

Bruce M. Fenton, Ph.D. (California, San Diego) Professor of Radiation Oncology and of Biomedical Engineering

Robert D. Frisina, Ph.D. (Syracuse) Professor of Otolaryngology, of Biomedical Engineering, and of Neurobiology and Anatomy

Sheryl Gracewski, Ph.D. (California, Berkeley) Professor of Mechanical Engineering and of Biomedical Engineering

Duncan T. Moore, Ph.D. (Rochester) Professor of Optics and of Biomedical Engineering and Rudolph and Hilda Kingslake Professor of Optical Engineering Science

Ruola Ning, Ph.D. (Utah) Professor of Imaging Sciences, of Oncology, of Radiation Oncology, and of Biomedical Engineering

Lukas Nowotny, Ph.D. (Swiss Federal Institute of Technology) Professor of Optics, of Physics, and of Biomedical Engineering and Scientist in the Laboratory for Laser Energetics

Gary Paige, M.D. (Chicago) Kikian J. and Caroline F. Schmitt Professor of Neurobiology and Anatomy, of Neurology, of Ophthalmology, of Brain and Cognitive Sciences, in the Center for Visual Science, and of Biomedical Engineering; Chair of Neurobiology and Anatomy

Kevin J. Parker, Ph.D. (M.I.T.) William F. May Professor of Engineering, Professor of Electrical and Computer Engineering, of Imaging Sciences, and of Biomedical Engineering; Dean, School of Engineering and Applied Sciences

Renato Perucchio, D. Engr. (Pisa, Italy) Professor of Mechanical Engineering and of Biomedical Engineering and Associate Professor of Pediatrics

J. Edward Pazas, Ph.D. (Rochester) Donald and Mary Clark Professor of Orthopaedics and Professor of Biomedical Engineering

Ingrid H. Sarelius, Ph.D. (Auckland, New Zealand) Professor of Pharmacology and Physiology and of Biomedical Engineering

Michael C. Schell, Ph.D. (Wisconsin, Madison) Professor of Radiation Oncology and of Biomedical Engineering

Denham S. Ward, M.D. (Miami) Professor of Anesthesiology and of Biomedical Engineering

David R. Williams, Ph.D. (California, San Diego) William G. Allyn Professor of Medical Optics, Professor of Brain and Cognitive Sciences, of Psychology, of Optics, of Ophthalmology, of Biomedical Engineering, and in the Center for Visual Science; Director of the Center for Visual Science

J. H. David Wu, Ph.D. (M.I.T.) Professor of Chemical Engineering, of Microbiology and Immunology, and of Biomedical Engineering

Jianhui Zhong, Ph.D. (Brown) Professor of Imaging Sciences, of Biomedical Engineering, and of Physics

Andrew Berger, Ph.D. (M.I.T.) Associate Professor of Optics and of Biomedical Engineering

Patricia Chess, M.D. (Columbia) Associate Professor of Pediatrics and of Biomedical Engineering

Edward G. Freedman, Ph.D. (Pennsylvania) Associate Professor of Neurobiology and Anatomy, of Biomedical Engineering, and in the Center for Visual Science

Denise Hocking, Ph.D. (Albany) Associate Professor of Pharmacology and Physiology and of Biomedical Engineering

Ben Miller, Ph.D. (Stafford) Associate Professor of Dermatology, Biochemistry and Biophysics, and of Biomedical Engineering

Jack G. Mottley, Ph.D. (Washington, St. Louis) Associate Professor of Electrical and Computer Engineering and of Biomedical Engineering

Edward M. Schwarz, Ph.D. (Albert Einstein College of Medicine) Associate Professor of Orthopaedics, of Microbiology and Immunology, of Urology, of Medicine, of Pathology and Laboratory Medicine, and of Biomedical Engineering

Wojciech Zareba, M.D. (Medical University of Lodz, Poland) Associate Professor of Medicine and of Biomedical Engineering

James M. Zavislak, Ph.D. (Rochester) Associate Professor of Optics, of Dermatology, of Ophthalmology, and of Biomedical Engineering

Lisa A. DeLoweise, Ph.D. (Pennsylvania State) Assistant Professor of Dermatology and of Biomedical Engineering

Jeffery Houck, Ph.D. (University of Iowa) Adjunct Assistant Professor of Biomedical Engineering

Walter O’Dell, Ph.D. (Johns Hopkins) Assistant Professor of Radiation Oncology and of Biomedical Engineering

Keith Schneider, Ph.D. (Rochester) Assistant Professor (Research) in the Center for Brain Imaging and of Biomedical Engineering

Geunyoung Yoon, Ph.D. (Osaka) Assistant Professor of Ophthalmology, of Biomedical Engineering, and in the Center for Visual Science

AFFILIATED FACULTY

Arthur Moss, M.D. (Harvard) Professor of Medicine

Alice Pentland, M.D. (Michigan) James H. Sterner Professor of Dermatology, Medical Director of Center for Future Health and Chair of Dermatology

Deborah Rubens, M.D. (Rochester) Professor of Imaging Sciences; Associate Chair of Imaging Sciences

Shey-Shing Sheu, Ph.D. (Chicago) Professor of Pharmacology and Physiology, of Medicine, and of Anesthesiology

Peter G. Shrager, Ph.D. (California, Berkeley) Professor of Neurobiology and Anatomy

Paul E. Bigeleisen, M.D. (California, Davis) Associate Professor of Anesthesiology

Karl Schwarz, M.D. (Rochester) Associate Professor of Medicine and of Biomedical Engineering

Xucui Chen, Ph.D. (Yale) Assistant Professor of Medicine, of Electrical and Computer Engineering, and of Biomedical Engineering

Jean-Philippe Couderc, Ph.D. (National Institute of Applied Science, Lyon, France) Research Assistant Professor of Medicine

Edwin Carstensen, Ph.D. (University of Pennsylvania) Arthur Gould Yates Professor Emeritus of Engineering and Senior Scientist in Electrical and Computer Engineering

Biomedical engineering (BME) involves the application of engineering science and technology to solve problems in biology and medicine. This broad area contains many career opportunities, ranging in scope from advanced research to engineering practice in a clinical setting. The Department of Biomedical Engineering, in conjunction with strong academic programs in the basic sciences and other engineering disciplines at the University of Rochester, offers outstanding training in this rapidly growing field.

B.S. IN BIOMEDICAL ENGINEERING

The Bachelor of Science degree program in biomedical engineering at the University of Rochester is one of 45 programs (as of October 2006) that is accredited by ABET. Our curriculum emphasizes fundamental engineering and design principles taught in the context of current problems in medicine and biology. A series of eight core courses required of all BME students provides a solid foundation in engineering principles relevant to biomedical engineering practice. To ensure in-depth training in engineering, students are required to complete a sequence of four engineering courses in a focus area of biomedical engineering. These areas of concentration are Biomechanics, Bioinstrumentation and Imaging, Cell and Tissue Engineering, and Medical Optics. The program is capped with a biomedical engineering senior design course required for all students. This program requires a total of 32.5 courses (130 credit hours), including a minimum of 51 credit hours devoted to mathematics and natural sciences and a minimum of 51 credit hours devoted to engineering.

Alternative recognition for meaningful biomedical engineering–related coursework and research is available through the minor in BME. The minor is available to students in any major.

Information about the minor or the major in biomedical engineering can be obtained at
the BME Undergraduate Office on the second floor of Goergen Hall or on our Web site at www.bme.rochester.edu.

DEPARTMENTAL MISSION AND OBJECTIVES
Mission
Our mission is to create and disseminate knowledge in engineering related to basic biomedical sciences and health care applications, and to provide students with the foundational knowledge and skills in biomedical engineering that they will need to become and remain leaders in their chosen field.

Undergraduate Program Objective
The overall educational objective of our program is to develop effective practitioners in biomedical engineering and associated fields. We expect that our graduates will contribute to advancement of their chosen field, while remaining mindful of the ethical and social implications of their work. They will have confidence in their abilities to apply foundational knowledge in the basic sciences, mathematics, engineering analysis, and design to address a wide range of problems in medicine and biology. In keeping with the continuously evolving nature of the field of biomedical engineering, we expect that our alumni will engage in lifelong learning, and that many of them, inspired by research experiences as undergraduates, will continue their education in advanced degree programs.

STANDARD FOUR-YEAR PROGRAM
Graduation requirements for BME: minimum of 130 credits.

All students majoring in biomedical engineering complete a common freshman and sophomore year:

Freshman Year
Fall
MTH 161*  
CHM 131  
BME 101  
CAS 105 (Primary Writing)
Spring
MTH 162*  
CHM 132  
PHY 121  
Humanities or social sciences

Sophomore Year
Fall
MTH 163 or 165*  
BIO 110  
PHY 122  
BME 201 & 201L
Spring
MTH 164*  
Basic science elective  
ECE 210  
Humanities or social sciences

BIOMEDICAL ENGINEERING CORE COURSES
Eight core courses are required for all students majoring in biomedical engineering:

- MTH 101. Introduction to Biomedical Engineering
- MTH 201. Fundamentals of Biomechanics and
- MTH 201L. MATLAB for Biomechanics
- ECE 210. Circuits for Scientists and Engineers
- BME 221. Biomedical Computation
- BME 230. Biomedical Signals and Measurements
- BME 260. Quantitative Physiology with Lab
- BME 295. BME Design Seminar (2 credits)
- BME 296. BME Senior Design
- BME 297. BME Senior Design

BIOMEDICAL ENGINEERING CONCENTRATION AREAS
Students choose to concentrate in one of four specialty areas. Four engineering courses forming a sequence in either Biomedical Measurement and Imaging, Biomechanics, Cell and Tissue Engineering, or Medical Optics are required. Each concentration includes an upper-level BME course in the specialty area.

Bioinstrumentation and Imaging
- ECE 241. Signals
- ECE 221. Electronic Devices and Circuits or
- ECE 230. Electromagnetic Waves
- ECE 246. Digital Signal Processing
- Upper-level BME: e.g., BME 251/451, Biomedical Ultrasound; BME 452, Medical Imaging

Biomechanics
- ME 226. Solids
- ME 225. Fluid Mechanics
- ME 123. Thermodynamics
- Upper-level BME: e.g., BME 283/483, Biosolid Mechanics

Cell and Tissue Engineering
- CHE 243. Fluid Dynamics
- CHE 244. Heat & Mass Transfer
- CHE 225. Thermodynamics
- Upper-level BME: e.g., BME 262/462, Cell and Tissue Engineering

Medical Optics
- OPT 241. Geometrical Optics
- OPT 261. Interference & Diffraction
- OPT 262. Electromagnetic Theory or
- OPT 224. Laser Systems
- PHY 123. Wave and Modern Physics
- Upper-Level BME: e.g., OPT 448, Principles of Eye Design; OPT 276, Biomedical Optics

In addition to concentration-area courses, students are required to complete the following basic science, math, and distribution requirements as well as electives complementing the BME courses.

One Primary Writing Requirement Course
Students are required to fulfill the University primary writing requirement. Typically, the course CAS 105 is used for this requirement.

Basic Sciences and Mathematics
- Four math courses: MTH 161, 162, 163/165, 164
- Two chemistry courses: CHM 151, 152
- Two physics courses: PHY 121, 122
- One biology course: BIO 110

Basic Science Electives (12 credit hours)
All students must complete at least three additional courses (at least 12 credit hours) in the basic sciences beyond the required introductory biology (BIO 110), chemistry (CHM 131 and 132), and physics (PHY 121/141 and 122/142) courses. Any biology, microbiology, neuroscience, chemistry, or physics course with a number greater than 109 may be used to fulfill this requirement (excluding BIO 111, 112, 115). At least two of these courses must have a laboratory component. At least two courses must be life science courses (i.e., biology, microbiology, neuroscience). Students are encouraged to choose their basic science electives to complement their BME concentration area. Independent study courses cannot be used to satisfy this requirement.

Humanities and Social Sciences
Students must take four courses in the humanities and/or social sciences. Three of these courses must complete an approved cluster.

Technical Elective (4 credit hours)
Students are required to take 4 credit hours of engineering coursework. Suitable courses must have significant engineering design, analysis, synthesis, or technical components. Classes that are primarily mathematics or science courses may not be used. Classes that are equivalent to core or concentration courses are disallowed, e.g., ME 225 (Fluid Mechanics) cannot be used as a technical elective in CHE 243 (Fluid Dynamics) has already been taken to fulfill the concentration requirements and vice versa. Courses that are cross-listed with non-SEAS departments (e.g., CHE 277/ASA277) must be taken under the SEAS registration. The following courses may not be used towards the technical elective requirement for one or more of the reasons above: ECE 211, 213, 399; CHE 211, 290; ME 120, 163, 164, 202, 211; OPT 287; any EAS course.

ADMISSION REQUIREMENTS
To be considered for admission to the biomedical engineering major a student must have taken courses to enable writing of a program of study that satisfies the requirements of the program and that can be completed in a total of four years.

The minimum requirements for admission to the BME program are
- satisfactory completion of BME 101 (by the end of the sophomore year)
- two engineering courses (usually ECE 210, BME 201 and 201L)
- a minimum GPA of 2.15 in these three courses
- satisfactory completion of the basic science and math requirements

*An alternative to the MTH 161 and 162 sequence is the MTH 141, 142, and 143 sequence. Careful attention must be paid to the effects of this longer sequence, including the possible need to take a course in the summer following the first year.
MINOR IN BIOMEDICAL ENGINEERING

The biomedical engineering minor provides substantive exposure to the biological and engineering sciences and gives students a basic perspective on the complex structure and function of living systems and their analysis by physical and engineering principles. The minor is available to students in all majors, but engineering and biology students find it easier to complete these requirements. Students may not use more than two of the courses required for the BME minor to also satisfy requirements in their major (including technical electives). All students that propose a minor in BME must fulfill the basic math requirements (MTH 163/165).

COURSES OF INSTRUCTION

218. Introduction to Biomedical Engineering. An introductory overview of the multidisciplinary field of biomedical engineering. Application of elementary engineering principles to the analysis of physiological systems. Includes basic introduction to the use of computers as tools for solving engineering problems. Course topics include biomechanics, cell and tissue engineering, biosignals and bio-instrumentation, medical imaging, medical optics, and bioethics. Includes some guest lectures by biomedical engineering faculty. (Fall)

201. Fundamentals of Biomechanics. Teaches static and dynamic rigid-body mechanics with applications in prosthetics, human movement, and other biomedical topics. Prerequisites: MTH 161 and 162, BME 101, PHY 121. (Fall)

2011. MATLAB for Biomechanics. Credit—1 hour. This half-semester laboratory provides students with the foundation in computer programming required to complete the BME 201 student project. The lab introduces the MATLAB-interpreted language through lectures, computer laboratory procedures, and assignments. Particular emphasis is placed on the use of MATLAB for both the computation and the effective presentation of scientific data and results. Topics include variables, functions, vector and matrix syntax, flow control, logical tests, graphics, and data file access. Concurrent with 201. (Fall)

218/418. Introduction to Neuroengineering. This course introduces many aspects of neuroengineering research, with an emphasis on biologically plausible models of neurons, circuits, and systems. The course begins with a brief review of passive membrane properties and Hodgkin-Huxley channel dynamics, and extends to advanced topics including neural circuits, control systems, and biologically plausible neural models of behavior. There is an emphasis on theory, modeling, and simulation of single neurons, neural networks, and systems. (Fall)

221. Biomedical Computation. The application of numerical and statistical methods to model biological systems and interpret biological data, using the MATLAB programming language. Prerequisites: BME 201 and 211, or permission of instructor. (Fall)

228/448. Physiological Control Systems. The course focuses on the application of control theory to physiological systems. Lectures present modern control theory in the context of physiological systems that utilize feedback mechanisms. Lectures begin with an overview of linear systems analysis including Laplace Transforms and Transfer functions. The response dynamics of open- and closed-loop systems such as the regulation of cardiac output and level of glucose are discussed. Other topics include stability analysis and identification of physiological control systems. (Spring)

230. Biomedical Signals and Measurements. This course examines the array of instrumentation and techniques used in the acquisition, processing, and presentation of biomedical signals. Topics include transducers, sensors, Fourier analysis, the ECG signal, flow measurement, medical imaging, and biosensors. Laboratory sessions cover amplifiers, bridge circuits, and the measurement of physical parameters (temperature, pressure, strain) and electrophysiological signals. Prerequisites: ECE 113 or 210, or permission of instructor. (Spring)

251/451. Biomedical Ultrasound. The physical basis for the use of high-frequency sound in medicine (diagnosis, therapy, and surgery) and biology. Topics include acoustic properties of tissues, sound propagation (both linear and nonlinear) in tissues, interactions of ultrasound with gas bodies (acoustic cavitation and contrast agents), thermal and nonthermal biological effects of ultrasound, ultrasonography, dosimetry, hyperthermia, and lithotripsy. Prerequisites: MTH 163, MTH 164, PHY 122, or permission of instructor. (Spring)
respiratory system, the renal system, and a variety of neural systems. Prerequisite: ECE 115 or ECE 210 or permission of instructor. (Fall) 262/462. Cell and Tissue Engineering. This course teaches the principles of modern cell and tissue engineering with a focus on understanding and manipulating the interactions between cells and their environment. After a brief overview of cell and tissue engineering, the course covers five areas of the field. These are (1) physiology for tissue engineering; (2) bioreactors and biomolecule production; (3) materials for tissue engineering; (4) cell cultures and bioreactors; and (5) drug delivery and drug discovery. Within each of these topics the emphasis is on analytical skills and instructors assume knowledge of chemistry, mass transfer, fluid mechanics, thermodynamics, and physiology consistent with the cell and tissue engineering track in BME. In a term project, students must present written and oral reports on a developing or existing application of cell and tissue engineering. The reports must address the technology behind the application, the clinical need, and any ethical implications. Prerequisites: BME 260, CHE 225, CHE 243, CHE 244, or permission of instructor. (Spring) 283/483. Biosolid Mechanics. Application of engineering mechanics to biological tissues including bone, soft tissue, cell membranes, and muscle. Realistic modeling of biological structures, including the heart, cells, and musculoskeletal joints. Experimental methods and material models. Same as ME 483 and BPH 483. Prerequisites: ME 226, BME 201, and 201L. (Fall) 295. Design Seminar. Credit—2 hours. Introduction to design of medical devices and instruments. Students are introduced to methods and strategies for creative design while considering ethical, economic, regulatory, and safety issues. In addition to benchmarking existing devices, students prepare for a design project to be completed in the following semester. Prerequisites: math, science, and engineering courses appropriate for fourth-year students in BME. (Fall) 296. BME Design Project. Senior capstone design course in the Biomedical Engineering Program. Students work in teams to design, build, and test projects in biomedical engineering. Progress reports, a written final report, and a final oral presentation of the project are required. Prerequisites: math, science, and engineering courses appropriate for fourth-year students in BME, BME 295, BME 260, or permission of instructor. (Spring) 391. Independent Study. The following graduate courses are open to advanced undergraduates with permission of the instructor: 442. Cell Motility and Molecular Machines. Credit—2 hours. From single molecule motors transporting materials within cells to contracting muscle fibers, molecular machines come in a range of sizes and produce some of the most fascinating phenomena in biology. This course teaches the modern theories behind molecular engines, presuming only an elementary background in cell biology and mechanics. (Spring) 452. Medical Imaging—Theory and Implementation. Physics and implementation of X-ray, ultrasonic, and MR imaging systems. Special attention is given to the Fourier transform relations and reconstruction algorithms of X-ray and ultrasonic-computed tomography, and MRI. Prerequisites: ECE 242. (Spring) 453. Advanced Biomedical Ultrasound. This course investigates the imaging techniques applied in state-of-the-art ultrasound imaging and their theoretical bases. Topics include linear acoustic systems, spatial impulse responses, the k-space formulation, methods of acoustic field calculation, dynamic focusing and apodization, scattering, the statistics of acoustic speckle, speckle correlation, compounding techniques, phase aberration correction, velocity estimation, and flow imaging. A strong emphasis is placed on readings of original sources and student assignments and projects based on realistic acoustic simulations. (Fall) 466. Microhydrodynamics. Credit—3 hours. This course examines the unique physics of fluid flow and mass transport in microscale geometries. Such behavior is relevant to many engineering applications from microelectronics cooling to lab-on-a-chip biotechnology. Specific topics include electrokinetic effects on fluid flow, the motion of small suspended particles, and microscale bioreactors. Same as CHE 466. Prerequisites: MTH 161, 162, 163/165, 164, and CHE 243 or equivalent. (Spring) 485. Membrane Mechanics and Cell Adhesion. Credit—2 hours. This course focuses on the fundamental science underlying the mechanical behavior of cell membranes and the formation of adhesive contacts between cells and between cells and substrates. Our approach is to explore mathematical descriptions of the physical properties of biomembrane structures as well as the physics and chemical basis of cell adhesion. Basic aspects of the structure and composition of cell membranes and the classes of adhesion molecules found on cells are reviewed as a basis for the mathematical treatments. The course is typically taught in the first half of the spring semester and designed for upper-level undergraduates and graduate students. Prerequisite: some background in mechanics and cell biology recommended. (Spring) Eldred H. Chimonowitz, Ph.D. (Connecticut) Professor of Chemical Engineering Jehuda Greener, Ph.D. (Massachusetts, Amherst) Adjunct Professor of Chemical Engineering David R. Harding, Ph.D. (Cambridge, England) Professor of Chemical Engineering and Senior Scientist in the Laboratory for Laser Energetics Stephen D. Jacobs, Ph.D. (Rochester) Professor of Chemical Engineering, of Materials Science, and of Optics and Senior Scientist in the Laboratory for Laser Energetics Jacob Jorné, Ph.D. (California, Berkeley) Professor of Chemical Engineering Lewis J. Rothberg, Ph.D. (Harvard) Professor of Chemistry, of Chemical Engineering, and of Physics Yonathan Shapir, Ph.D. (Tel Aviv, Israel) Professor of Physics and of Chemical Engineering Ching W. Tang, Ph.D. (Cornell) Doris Johns Cherry Professor, Professor of Chemical Engineering and of Chemistry J. H. David Wu, Ph.D. (M.I.T.) Professor of Chemical Engineering, of Biomedical Engineering, and of Microbiology and Immunology David G. Foster, Ph.D. (Rochester) Adjunct Associate Professor of Chemical Engineering Michael King, Ph.D. (Notre Dame) Associate Professor of Biomedical Engineering, of Chemical Engineering and of Surgery Hong Yang, Ph.D. (Toronto) Associate Professor of Chemical Engineering Matthew Z. Yates, Ph.D. (Texas) Associate Professor of Chemical Engineering Mitchell Anthamatten, Ph.D. (M.I.T.) Assistant Professor of Chemical Engineering and Scientist in the Laboratory for Laser Energetics Thor Olsen, Stv.Ing. (Technical University of Norway) Instructor in Chemical Engineering and Laboratory Supervisor Ben W. Ebenhack, M.S. (Wyoming) Senior Lecturer in Chemical Engineering Michael Weinstein, M.S.E. (Pennsylvania) Lecturer in Chemical Engineering Richard Frederick Eisenberg, M.S. (Rochester) Professor Emeritus of Chemical Engineering Martin Robert Feinberg, Ph.D. (Princeton) Professor Emeritus of Chemical Engineering John Royal Ferron, Ph.D. (Wisconsin) Professor Emeritus of Chemical Engineering Howard Salzburg, Ph.D. (Boston) Professor Emeritus of Chemical Engineering

Chemical engineers apply the chemical and physical sciences to the solution of practical problems. They often work in business and industry but also use their engineering back-grounds in a wide variety of other occupations including the legal and medical professions. Some of our recent graduates work as environmental engineers, design biochemical processes, and develop new materials or processing methods for the microelectronics industry.

Chemical Engineering

Shaw-Horning Chen, Ph.D. (Minnesota) Professor of Chemical Engineering and of Materials Science and Senior Scientist in the Laboratory for Laser Energetics
The versatility demanded of chemical engineers requires that their abilities to use the basic sciences be especially well developed. Moreover, because the solutions to society’s problems frequently involve questions which transcend technical considerations and because our faculty is committed to a true university education for chemical engineering students, the curriculum is designed to include humanities and social sciences as well as the physical and biological sciences, mathematics, and engineering.

Courses in chemical engineering are coordinated with separate chemical engineering laboratory courses in the junior and senior years. In these lab courses, students explore fundamental concepts learned in lectures, and gain experience in problem definition and experiment design in a project format. All laboratories make extensive use of microcomputers for data acquisition and analysis, complementing their use for computation in other courses.

For admission to a concentration in chemical engineering, the student is required to have a grade-point average of 2.15 in all chemistry and chemical engineering courses taken during the first four semesters. For graduation a student must earn a grade-point average of 2.0 in all chemical engineering courses in addition to having an overall average of 2.0.

A minor in chemical engineering is available and is especially useful for students interested in technical management or careers which involve the assessment of technology and society.

The chemical engineering department also offers minors in environmental engineering and biomedical engineering for students interested in the application of engineering and scientific principles to environmental issues.

ADVISING
Each student is assisted by a faculty advisor in planning an individual program of study, especially in the choice of electives. Faculty advisors help students to make sure that programs satisfy minimum degree requirements and, in addition, the minimum professional accreditation requirements of the Accreditation Board for Engineering and Technology and of the American Institute of Chemical Engineers. Chemical engineering students are required to meet with their advisor each semester and demonstrate how their selection of courses will be used to meet department and accreditation requirements.

ELECTIVES
The B.S. program is described on the department’s Web site: www.che.rochester.edu. It consists of the equivalent of 31 4-credit courses plus two chemical engineering laboratories (for 6 credits), and an organic chemistry laboratory (the minimum number of credit hours being 130). Eleven courses (44 credit hours) in the four-year program are electives. One elective is a free elective (4 credit hours) and may be chosen however the student wishes. Five electives (that is, 20 credit hours) must be in the humanities or social sciences, with some courses selected in each area to provide breadth in the student’s program of study. ChemE majors also must complete at least one approved cluster in a nontechnical subject area, in compliance with graduation requirements in the College. Generally students choose to meet this cluster requirement by a judicious selection of their five humanities and social science electives. This option may not be possible for those who choose to do a cluster in business. An alternative is to earn a minor in a humanities or social science discipline. ENG 101 and 111–129 do not count toward this nontechnical course requirement in the chemical engineering program. The five remaining electives (20 credit hours) are chosen from technical courses in consultation with faculty advisors. These technical electives are subject to the following restrictions:

1. One course must be in applied mathematics. MTH 164 is highly recommended, but any advanced math course taught in the math department is appropriate.
2. One course (4 credits) must be in advanced chemistry or biology/biochemistry or earth and environmental sciences to supplement the required chemistry courses explicitly identified in the typical four-year program below. In addition, chemistry-related courses in the chemical engineering department, such as CHE 260, 286, and 287, and certain courses in other departments, for example EES 217, 218, and 269, may be used as an advanced chemistry elective.
3. The three remaining technical courses (12 credits) must be science/engineering courses. Chosen to broaden the student’s engineering background or to pursue an area of special personal interest in more depth, these courses are usually completed in the junior and senior years and normally do not include more than one course at the 100 level. Qualified undergraduates should consider 400-level graduate courses, or personal research or design projects as technical electives, particularly if they are considering an application to the department’s 3-2 B.S.-M.S. program. Students are urged to consult widely and select their technical electives carefully. The department provides many opportunities for undergraduate students to pursue more in-depth study with individual faculty members. This can take on the form of independent research courses (CHE 395) or paid research internships over the summer months. Department strengths and focus areas include biotechnology—problems of common interest to biologists, biochemists, physicians, and engineers; polymers and advanced materials—their structure, properties, and manufacture; energy resources—fossil fuels, their production, chemical processing, and uses; other sources: solar and fuel cells, hydroelectric, geothermal, etc.; systems and controls—the behavior of complex chemical processes and their online control in environmental engineering—engineering methods applied to community or ecological problems; surface chemistry and catalysis—unique properties of interfaces separating solids, liquids, and gases; computer applications—computer use in chemical processing systems.

COMPUTER COMPETENCY
All chemical engineering students are required to develop competency in computational analysis and the use of mathematical programming languages. In addition, students must become familiar with the use of microcomputers. These requirements should be met before entering the third year of undergraduate study. Typically, minimum competency is achieved by successfully completing CHE 116, Fundamentals of Computing. The course introduces students to programming methods useful in simulation work and numerical computation encountered in upper-level lecture and design courses.

As an alternative to CHE 116, students may fulfill this requirement by earning at least a B– in CSC 171 or equivalent, or by having earned a 4 or 5 on the AP Computer Science exam. Such students must complete 2 credits of a free elective in place of the CHE 116 requirement.

FIRST-YEAR CHE COURSES
The chemical engineering department provides ways for new students to gain a better understanding of what chemical engineers do. In the spring term, a ChemE elective, CHE 150, is taught to introduce students to problems where chemical engineering ideas are used to solve technical problems in an informal, project-oriented setting. In addition, several informal meetings are organized.
MINOR IN CHEMICAL ENGINEERING
The minor in chemical engineering is especially appropriate for chemistry, mechanical engineering, and environmental science majors who want to broaden their background for work in the chemical process industry. It is also useful for students interested in technical management or careers that involve the assessment of technology and society. The minor consists of a coherent sequence of six courses (or 24 credits) subject to the following restrictions:

1. Required background: CHM 131 and MTH 161 or equivalent.
2. Four chemical engineering courses from the following:
   - CHE 113
   - CHE 225
   - CHE 243
   - CHE 244
   - CHE 251
   - CHE 253
3. Exception: Biomedical degree students with a Cell & Tissue Concentration are required to take two courses in addition to CHE 225, 243, and 244.

MINOR IN ENVIRONMENTAL ENGINEERING
1. Required background: CHM 131 and MTH 161 or equivalent.
2. Two chemical engineering courses from the following:
   - CHE 150
   - CHE 278
   - CHE 278
   - CHE 290
3. Two courses from the following:
   - BIO 102
   - EES 205
   - EES 215
   - EES 218
   - TOX 521

CHEMICAL ENGINEERING MAJOR WITH BIOMEDICAL MINOR
1. Required background: MTH 161, 162, and 165, CHM 132, and PHY 122 or equivalent.
2. Seven required courses:
   - BME 101
   - CHE 243
   - BIO 110
   - Two BME
   - BIO 111
   - technical electives
   - BIO 111L

TYPICAL FOUR-YEAR PROGRAM

First Year
- MTH 161
- CHM 131
- Elective
- CAS 105 (Primary Writing)

Second Year
- MTH 164
- CHE 203
- CHE 207
- CHE 113
- Elective

Third Year
- CHE 244
- CHE 225
- PHY 122
- Elective

Fourth Year
- CHE 273
- CHE 255
- MTH 251
- Elective

UPPER-LEVEL WRITING REQUIREMENT
All students in the College must satisfy an upper-level writing requirement. Chemical engineering majors meet this requirement within the context of the two laboratory courses and the capstone design course (CHE 246, 255, and 275), all of which emphasize technical writing as well as oral communication and help students to refine these skills.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

113. Chemical Process Analysis. Methodology and problem-solving techniques in chemical engineering; the concepts of mass and energy conservation in both reacting and nonreacting chemical systems; the concept of equilibrium in chemical and physical systems, and the basic principles of thermodynamics are presented. Both steady-state and transient behavior are discussed for some special systems. Lectures and discussion. Prerequisites: CHE 113, MTH 165. (Spring)

116. Fundamentals of Computing. Credit—2 hours. This seven-week course provides an introduction to Microsoft Excel and its powerful VBA (Visual Basic for Applications) programming environment. Although chemical engineering concepts are integrated into the curriculum, no prior chemical engineering experience is required. This course is of value to engineers and analytically oriented individuals of many disciplines. Students learn and apply a number of general tools/approaches that will facilitate analytical problem solving in a wide variety of situations. Although no prior Excel or programming experience is required, the course does provide instruction on a select set of more advanced topics such as nonlinear curve fitting and nonlinear optimization. (Spring)

150. Green Engineering for a Sustainable Environment. This course introduces the issue of green engineering ideas in pursuit of "sustainable technology," which is emerging as a critical technology in advanced industrial societies. By sustainable technology we mean the development of environmentally benign processes that have minimal adverse impact on the surrounding earth's ecosystem. (Spring)

211. Probability for Chemical Engineers. Credits—2 hours. This course provides an introduction to probability theory applied to engineering problems. Students study the basic elements of probability theory including the properties of special random variables like the Normal, Poisson, and Exponential distributions. Applications to chemical/environmental engineering problems are discussed as well as the use of statistical simulations using Wiener sampling methods. (Spring, alternate semesters)

225. Chemical Engineering Thermodynamics. Lectures on the origin and use of the first and second laws of thermodynamics, followed by a discussion of equilibrium criteria. Thermodynamic descriptions of real gases and liquids are developed and applications of thermodynamics to phase and chemical equilibria complete the course. (Fall)

231. Chemical Reactor Design. Review of chemical kinetics; methods of kinetic data collection, analysis, and interpretation; calculation of simple reactor designs. Emphasis is on homogeneous uncatalyzed reactions, but heterogeneous and catalyzed reactions are considered. Prerequisites: MTH 165, CHE 113. (Spring)

243. Fluid Dynamics. Basic principles of fluid flow, conservation of mass, momentum, laminar flow problems, dimensional analysis, macroscopic balances, and design of fluid flow systems. Prerequisites: PHY 121, MTH 165. (Spring)

244. Heat and Mass Transfer. A fundamental course in heat transfer processes and an introduction to mass transfer. Topics include equations of energy conservation, conduction, convection, radiation; equations for chemical species conservation, diffusion, macroscopic balances. Emphasis on problem solving, especially for purposes of design. Prerequisites: CHE 243, MTH 165, fluid mechanics. (Fall)

246. Laboratory in Chemical Engineering Principles. Credit—3 hours. Hands-on experience with concepts in phase equilibrium, heat and mass transfer, and chemical kinetics. Emphasis on measurement techniques, computing for real-time data acquisition, data analysis, and experimental design.
Involves structured experiments, open-ended projects, and oral and written reports. Prerequisites: MTH 161, 162, CHM 131 or equivalent. (Spring)

250. Separation Processes. Application of mass transfer and thermodynamics to chemical separation techniques. Fundamentals and design of processes such as distillation, absorption, extraction, and crystallization. Fixed-bed operations, such as ion exchange and chromatography, and membrane processes are also considered. Prerequisites: CHE 113, 244. (Spring)

255. Laboratory in Chemical Engineering Processes. Credit—3 hours. Operation and scale-up of chemical process equipment for chemical reaction and purification. Examination of the factors that affect performance in practice. Exploratory experiments and preliminary experimental design, as well as oral and written reports, are required. Prerequisites: CHE 244, 251, 250. (Fall)

258. Electrochemical Engineering and Fuel Cells. Credit—2 hours. The course concentrates on presenting the principles of electrochemistry and electrochemical engineering, and the design considerations for the development of fuel cells capable of satisfying the projected performance of an electric car. The course is expected to prepare students for the challenges of energy conversion and storage and the environment in the twenty-first century. (Fall, half semester)

259. Transport Phenomena BIO Systems. Credit—4 hours. This course provides an overview of transport phenomena in biological systems that are critical to the function of all living organisms. The fundamental laws and equations of transport phenomena are applied to topics including cellular, cardiovascular, respiratory, liver and kidney transport, blood flow and rheology, and circulation in tissues and arteries. (Fall)

272. Process Dynamics and Control. Credit—2 hours. Lectures, problem sets, and design projects. Introduction to the dynamic behavior of chemical engineering systems and to the analysis of feedback control systems. Methods of design of single feedback loops and multivariable systems are covered. Prerequisite: CHE 113. (Spring)

273. Chemical Engineering Process Design I. The course covers material related to the conception and design of chemical processes. Topics include energy systems analysis, the attainability region approach for reactor network synthesis, and the effects of statistical uncertainty on decision making when evaluating alternative designs. Modern techniques for stochastic simulation of random processes are also studied. The use of computational software packages like MATHCAD and DESIGN II is expected in doing many of the homework assignments. In addition to two examinations, a computer-oriented design project is assigned involving the use of chemical engineering principles for the solution of a process flow sheet problem. Prerequisite: senior standing in chemical engineering. (Fall)

277. Energy Resources and Utilization. Emphasis on technical and development aspects of energy resource problems. Applications of resource exploration and development in energy prospective locales that lack commercial energy development such as the rift basins and embayments of Africa. Consideration of quality-of-life impacts of energy. Problems considered include combustion of fossil fuels for heat and work, combustion products and environmental impact, comparison of fuels on environmental grounds, benefits of energy in social development, technology of energy exploration and development, and economics of energy development and acquisition. Same as AAS 277. (Spring)

278. Energy Alternative Lab. Students are presented with issues and technical problems in developing a more sustainable energy mix for a variety of societal needs. They conduct and design experiments which test various kinds of alternatives, including conservation technologies. The first few weeks involve discussion of the issues and two or three common experiments for the entire class. One project involves numerical modeling of a system. The remainder of the course involves extensive design and evaluation of a concept chosen by the student group. (Fall)

279. Chemical Engineering Practice. Credit—1 hour. Issues of relevance to the practice of chemical engineering. Topics include basic economic principles and marketing issues, ethics, plant safety, worker education and training, and environmental implications in process design. Students visit a local industry to gain perspective on the scale of a chemical process. Presentations by practicing engineers demonstrate the versatility of a chemical engineering education. (Spring)

280. Materials Engineering and Mechanical Design. Preparation, structure, composition, and properties of advanced materials with emphasis on the underlying chemistry. Atomic structure and bonding of crystalline and amorphous solids and crystal-line defect. Materials synthesis and processing by chemical and physical deposition methods. Focus on the relation of structure to properties of materials. Same as CHE 480. (Spring)

282. Processing of Microelectronic Devices. Credit—2 hours. An overview of processes used in the fabrication of microelectronic devices, with emphasis on chemical engineering principles and methods of analysis. Modeling and processing of microelectronic devices. Includes introduction to physics and technology of solid-state devices, grade silicon, microlithography, thermal processing, chemical vapor deposition, etching and ion implantation, and damascene processing. Same as CHE 482, MSC 438. (Fall, half semester)

286. Polymer Science and Technology. This course features the science and technology of synthetic macromolecules. Topics include polymerization reactions, structure and properties of semicrystalline and amorphous polymers, characterization of structure and properties, structure-property relationship in polymers, and applications of polymeric materials. Same as CHE 486, MSC 224, MSC 433. (Fall)

287. Polymer Rheology and Processing. This course provides an overview of polymer rheology with emphasis on application to polymer processing. Basic principles of rheology are discussed and general methods for rheological characterization of liquid and solid polymers are described and analyzed. The rheological principles are then applied, together with standard conservation laws, to the analysis and derivation of basic models for several key polymer fabrication processes, e.g., coating, extrusion, injection molding and film stretching. The unique transport and equilibrium properties of organic polymers are studied and applied, with basic chemical engineering principles, to the analysis of polymer processing. Topics include fluid flow and heat transfer in polymer systems, rheological equations of polymer systems, rheological equations of state, and the study of fabricating operations, such as calendaring, extrusion, and injection molding. Same as CHE 487, MSC 434. (Spring, alternate years)

290. Cars, Identity, and Mass Transportation. This interdisciplinary course, which is open to students from any major interested in the technical or social aspects of transportation, is oriented toward developing sustainable energy use in mass transportation. The challenge is to design a solar hybrid electric bus system that consumers find appealing. Students engage in ethnographic research to identify what the car symbolizes to consumers, why consumers prefer to use their cars rather than take mass transportation, and how new technologies can overcome reluctance toward using mass transportation. The need for transitions to new technologies that provide renewable energy and conserve resources on earth are discussed. Students learn about interdisciplinary teams to conduct ethnographic research and develop technical design concepts and models for a solar hybrid electric bus. Class discussion focuses on how to conduct ethnographic research and apply the findings to technical design. The interdisciplinary nature of the course provides fertile ground for thinking about social and environmental entrepreneurship and for creating value in society.

The following graduate courses are open to advanced undergraduates with permission of the instructor:

413. Molecular Self-Assembly.
421. Thin-Film Processing.
441. Advanced Fluid Mechanics.
442. Introduction to Molecular Simulation.
447. Optics and Liquid Crystals for Chemical Engineers.
454. Interfacial Engineering.
ELECTRICAL AND COMPUTER ENGINEERING

David Blackstock, Ph.D. (Harvard)  Visiting Professor of Electrical and Computer Engineering
Mark F. Bodko, Ph.D. (Rochester)  Professor of Electrical and Computer Engineering and of Physics. Chair of the Department
Victor V Derefenko, M.S. (Virginia)  Adjunct Professor of Electrical and Computer Engineering
Philippe M. Fauchet, Ph.D. (Stanford)  Distinguished Professor of Electrical and Computer Engineering, Professor of Materials Science, of Biomedical Engineering, and of Optics. Senior Scientist in the Laboratory for Laser Energetics
Eby G. Friedman, Ph.D. (California, Irvine)  Distinguished Professor of Electrical and Computer Engineering, Director, Center for Electronic Imaging Systems
Marc J. Feldman, Ph.D. (Berkeley)  Senior Scientist in and Professor (Research) of Electrical and Computer Engineering
Thomas Y. Hsiang, Ph.D. (Berkeley)  Professor of Electrical and Computer Engineering, Associate Dean of the School of Engineering and Applied Sciences
Thomas B. Jones, Ph.D. (M.I.T.)  Professor of Electrical and Computer Engineering
Kevin J. Parker, Ph.D. (M.I.T.)  William F. May Professor of Engineering and Professor of Electrical and Computer Engineering, of Biomedical Engineering, and of Imaging Sciences. Dean, School of Engineering and Applied Sciences
Alex Pentland, Ph.D. (M.I.T.)  Adjunct Professor of Electrical and Computer Engineering
Roman Sobolewski, Ph.D. (Warsaw)  Professor of Electrical and Computer Engineering and of Materials Science and Senior Scientist in the Laboratory for Laser Energetics
A. Murat Tekalp, Ph.D. (Rensselaer)  Adjunct Professor of Electrical and Computer Engineering
Edward L. Titlebaum, Ph.D. (Cornell)  Professor of Electrical and Computer Engineering
Robert C. Waag, Ph.D. (Cornell)  Arthur Gould Yates Professor of Engineering, Professor of Electrical and Computer Engineering and of Imaging Sciences
Wendi B. Heinzelman, Ph.D. (M.I.T.)  Associate Professor of Electrical and Computer Engineering and of Computer Science
Jack G. Mottley, Ph.D. (Washington, St. Louis)  Associate Professor of Electrical and Computer Engineering and of Biomedical Engineering
Gaurav Sharma, Ph.D. (North Carolina State)  Associate Professor of Electrical and Computer Engineering
Paul Amapadu, Ph.D. (Cornell)  Assistant Professor of Electrical and Computer Engineering
Hanan Dery, Ph.D. (Technion-Israel Institute of Technology)  Assistant Professor of Electrical and Computer Engineering
Erich C. Everbach, Ph.D. (Yale)  Adjunct Assistant Professor of Electrical and Computer Engineering
Michael Huang, Ph.D. (Illinois at Urbana/ Champaign)  Assistant Professor of Electrical and Computer Engineering and of Computer Science
Zeljko Ignjatovic, Ph.D. (Rochester)  Assistant Professor of Electrical and Computer Engineering
Martin Mangala, Ph.D. (Alberta)  Adjunct Assistant Professor of Electrical and Computer Engineering
Azadeh Vosoughi, Ph.D. (Cornell)  Assistant Professor of Electrical and Computer Engineering
Hui Wu, Ph.D. (California Institute of Technology)  Assistant Professor of Electrical and Computer Engineering
Alexander Albicki, Ph.D. (Warsaw)  Professor Emeritus of Electrical and Computer Engineering

Stephen McAlavy, Ph.D. (Rochester)  Assistant Professor of Biomedical Engineering and of Electrical and Computer Engineering

Much of the modern technological landscape has been shaped by electrical and computer engineers. Technologies such as the Internet, television, wireless phones, and digital audio make possible many new and productive activities. To turn ideas into reality, electrical and computer engineers need to understand the physical principles underlying electrical phenomena and the mathematics used to describe the behavior of electrical systems. Furthermore, they need to learn and to practice the principles of design and problem solving so that they can apply their knowledge effectively. Finally, they need to keep themselves informed of new developments in science and technology in order to meet tomorrow’s challenges.

UNDERGRADUATE PROGRAMS

Our mission is to provide our students with the knowledge and skills that will enable them to build productive careers in the field of electrical and computer engineering. We teach our students the principles and good practices of modern basic and applied electrical and computer engineering. We train them to solve problems systematically, yet to think creatively, and we develop in them an awareness of the role of engineering in modern society.

The electrical and computer engineering curriculum at the University of Rochester encourages students to pursue individual interests and goals with respect to both general educational and professional training. The curriculum emphasizes fundamentals that prepare a student for lifelong learning to meet the career challenges presented by rapidly changing technologies. The electrical and computer engineering department’s nationally recognized faculty and laboratories, combined with an outstanding faculty-student ratio, create the ideal environment for training the twenty-first-century engineer.

Curricular flexibility in the third and fourth years permits specialization in signals and communications, solid state devices and microelectronics, computer engineering, and electromagnetic fields, waves, and devices. A premedical program is available for students interested in the combination of engineering and medicine. In addition, students interested in law or management may take preparatory courses in these subjects as electives.

The curriculum is based on a set of lower- and upper-division core courses required of all students and emphasizing the application of mathematical, computer, and physical concepts to the solution of engineering problems. Nearly all undergraduate ECE courses include laboratory work intended to provide students with extensive design experience.
Below is the standard four-year 128-credit-hour electrical and computer engineering curriculum, showing the University requirements, electrical and computer engineering core courses, and other departmental requirements. The order of completion of upper-division requirements is primarily the decision of the student and his or her advisor, although attention must be given early in the program planning process to prerequisites.

### STANDARD FOUR-YEAR PROGRAM

**First Year**
- ECE 112 or ECE 140
- MTH 161
- CAS 105 (Primary Writing)
- Elective (human or social science)

**Second Year**
- ECE 113
- MTH 162
- PHY 122
- Elective (human or social science)

**Third and Fourth Years**
- ECE 221
- ECE 241
- ECE 230
- Plus the following:
  - MTH 201
  - 1 ECE advanced elective course
  - 1 ECE capstone design course
  - 1 ECE seminar
  - Free electives to complete the balance of 128 credit hours.

A total of 12 ECE courses, as well as an ECE capstone design course plus the two seminar courses, ECE 398 and 399, are required for graduation. ECE 399 should be taken in the junior year and ECE 398 must be satisfactorily completed, usually in the fall term of the senior year, prior to undertaking the capstone design course.

### ACCREDITATION

The ECE program meets the professional accreditation requirements established by the Accreditation Board of Engineering and Technology (ABET) and the Institute of Electrical and Electronics Engineers (IEEE).

Upon completion of the B.S. ECE program, our graduates are eligible to take the Fundamentals of Engineering Examination, which is the first step in earning professional registration.

### ADMISSION

To be considered for admission to the concentration in electrical and computer engineering, students complete the following: the required first- and second-year courses (ECE 111, 112, 113, and 114) or equivalent, with a minimum grade-point average of 2.3; complete MTH 161, 162, 165, 164, or equivalent mathematics sequence; and PHY 121, 122, 123 (or other natural science course in place of PHY 125).

Students must also have completed the University primary writing requirement (CAS 105). In addition, a minimum grade-point average of 2.0 must be achieved overall. The four required ECE courses, ECE 111, 112, 113, and 114, must be taken at the University of Rochester. An exception is made for students who have been admitted directly into the program via the transfer admission process. Only courses taken at Rochester are used in calculating the grade-point average.

Any student who wishes to major in electrical and computer engineering is required to file a Concentration Approval Form approved by his or her faculty advisor, usually during the fourth semester of study. For graduation, electrical and computer engineering majors are required to achieve a cumulative grade-point average of at least 2.0 in the 12 courses constituting the ECE undergraduate core.

Students who desire a more flexible program and who elect to forego an ABET-accredited degree may plan a degree program leading to a B.A. in engineering science (page 156) or plan a degree program under the Interdepartmental Programs (page 156).

### B.S.-M.S. PROGRAM IN ELECTRICAL AND COMPUTER ENGINEERING

Electrical and computer engineering juniors are encouraged to consider the special five-year program outlined below. Students are accepted into this program in the spring of their junior year and can begin graduate-level independent work in their senior year. At the end of the five-year program, both a B.S. and an M.S. in electrical and computer engineering are awarded. Students may pursue either a Plan A (with thesis) or a Plan B (with a comprehensive examination) M.S. degree program.

To be accepted, students must have a good academic record and must have completed the lower-division core courses and at least two of the upper-division core courses by the end of their junior year. Students admitted to the program may also be considered for financial aid in the fifth year.

### ELECTRICAL AND COMPUTER ENGINEERING MINOR

The formal requirements for the minor in electrical and computer engineering are five ECE courses. There are no specific course requirements, although a focused program of study should be planned with an advisor in the electrical and computer engineering department.

Students should contact the ECE department office to arrange to meet with an advisor.
UPPER-LEVEL WRITING REQUIREMENT
ECE 111, 112, 113, and 399 fulfill the College upper-level writing requirements.

COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

111. Introduction to Signals and Circuits. Analysis techniques for DC and AC circuits. (Fall)

112. Logic Design. Two-level and multi-level combinational logic minimization. Programmable logic. Sequential logic design. Finite state machines optimization and implementation. Rapid prototyping, Laboratory: Field Programmable Gate Array (FPGA) designs. Prerequisites: one semester of college mathematics. Ability to operate computers. (Spring)

113. Circuits and Signals. Signal representation and applications to circuits: AC circuits and phasors, complex frequency, amplifiers and filters, resonance, two-port networks, Fourier series, Fourier transforms, Laplace transforms. Prerequisites: ECE 111, MTH 163, or MTH 165. (Spring)

114. Introduction to Computers and Programming. Introduction to principles of well-structured and efficient computer programming in the C++ language. Topics include development and analysis of algorithms, debugging strategies, program verification, computer hardware, basics of the C++ programming language and techniques for developing computer programs using this language. (Spring)


200/400. Computer Architecture. Instruction set principles; processor design, pipelining, data and control hazards; datapath and computer arithmetic; memory systems; I/O and peripheral devices; internetworking. Students learn the challenges, opportunities, and tradeoffs involved in modern microprocessor design. Assignments and labs involve processor and memory subsystem design using hardware description languages (HDL). Prerequisite: ECE 114 or CSC 171. (Spring)


210. Circuits for Scientists and Engineers. Circuit analysis considering passive RLC elements, ideal and controlled sources, op-amps, steady-state and transient response, transfer functions, filters. Technical elective for non-ECE majors. Laboratory. Prerequisites: MTH 163, PHYS 122. (Spring)

216. Microprocessors and Data Conversion. Characteristics and specifications of microcomputer components including microprocessors, memories, and interfacing devices. Topics include machine language programs, data conversion, and database configurations. Laboratory: Prerequisites: ECE 112, 113, or permission of instructor. (Spring)

220. Introduction to Solid State. Basic theory and phenomena of solid-state physics, with applications to electronic properties of metals, semiconductors, superconductors, and insulators. Same as PHY 251, ECE 420, MSC 420. Prerequisites: PHY 123, MTH 164. (Fall)

221. Electronic Devices and Circuits. Introduction to the physics and operation of semiconductor devices and to the design and analysis of basic electronic circuits. Semiconductor transport properties, p-n junction diodes, and diode circuits. Bipolar junction transistors. Single- and multi-stage BJT amplifiers. Differential amplifiers. Small-signal analysis, bias design, time and frequency response of BJT circuits. Laboratory. Prerequisite: ECE 113. (Fall)

222. Integrated Circuits Design and Analysis. Introduction to the design and analysis of digital and analog integrated circuits. Topics include behavioral modeling. Prerequisite: ECE 221 or permission of instructor. (Spring)


226/426. Superconducting Electronics. Superconducting devices and circuits, both analog and digital. Principles and design of low-power, high-speed digital integrated circuits. Generation and low-noise detection of electromagnetic radiation. Laboratory, including SPICE simulations. Prerequisites: ECE 111, PHYS 123, MTH 164. (Fall)


231/431. Microwaves and Wireless. Generation, transmission, control, and detection of electromagnetic waves. Antennas, cavities, couplers. Path loss, multipath, channel characteristics. Prerequisite: ECE 230 or permission of instructor. (Spring)


235/435. Introduction to Optoelectronics. Introduction to fundamentals of electromagnetic wave propagation in materials, waveguides and fibers, generation, modulation and detection of light using semiconductor devices, and elements of optocommunication systems. Prerequisites: ECE 230, 221, equivalent permission of instructor. (Fall)

240. Musical Sound: Science and Synthesis. Engineering and physical science concepts underlying musical sound analysis and synthesis. Oscillation, waves, impedance, musical instrument sound production, digital representation of musical signals, spectra, digital filtering, subtractive and additive music synthesis, FM synthesis, sampling, physical modeling. Prerequisite: ECE 241 or permission of instructor. (Spring, taught alternate years with ECE 140)

241. Signals. Introduction to continuous and discrete time signal theory and analysis of linear time-invariant systems. Signal representation, convolution, Fourier analysis, filtering of continuous and discrete time signals, Laplace and Z transforms. Laboratory. Prerequisites: MTH 164, ECE 113. (Fall)

242. Communications. Analog and digital modulation and demodulation theory. Introduction to probability theory and stochastic processes, statistical characterization of noise and communication channels. Performance of communication systems in the presence of noise. Laboratory. Prerequisite: ECE 241. (Spring)

244. Digital Communications. Digital communication system elements, characterization and representation of communication signals and systems. Digital transmission, binary and M-ary modulation schemes, demodulation and detection, coherent and incoherent demodulators, error performance. Channel capacity, mutual information, simple discrete channels and the AWGN channel. Basics of channel coding and error correction codes. (Fall)

245/445. Wireless Communications. Underlying concepts of traditional cellular radio and wireless data networks (e.g., channel modeling, modulation, multiple-access, channel coding) as well as design tradeoffs among RF bandwidth, transmitter and receiver power and cost, system performance. Provides an in-depth look at modern cellular and ad-hoc data networks. Prerequisites: ECE 241, 242. (Spring)

246/446. Digital Signal Processing. Review of discrete-time signal systems, discrete Fourier transform, FFT algorithms, windows and classic spectral analysis, circular convolution, Z-transform, difference equations,
discrete-time filtering, FIR and IIR filter design, multirate signal processing. Laboratory. Prerequisite: ECE 241. (Fall) 261/461. Digital Integrated Circuit Design. Issues in digital integrated circuit design. The devices. CMOS inverter. Combination of logic gates in CMOS. Designing sequential logic circuits. Designing arithmetic building blocks. Timing issues in digital circuits. Memories and array structures. Design verification and testing. Design projects using computer-aided design tools: SPICE, MAGIC, IRISIUM, OCTOOL. Prerequisites: ECE 112, 221. (Fall) 266. RF Integrated Circuits. This course involves the analysis and design of radiofrequency (RF) integrated circuits at the transistor level. Course begins with an introduction to radio architectures and specifications, followed by reviews of device physics and transmission line theory. After discussion of RLC networks, high-frequency amplifiers are studied, followed by wideband amplifiers. Then the important issue of noise with the design example of low-noise amplifiers (LNA) is examined. Nonlinear circuits are studied next with the example of mixers, followed by oscillators and the important subject of phase noise. Phase-locked loops and frequency synthesizers are then discussed. A study of RF power amplifiers follows, and the course concludes with an overview of transceivers. The course emphasizes the development of both circuit design intuition and analytical skills. There are weekly design labs and a term project using EDA tools. (Fall, alternate years) 349. Communication Design Project. Senior design course for “Communications, Signals, and Systems” concentration. Prior faculty approval required for design project proposal. (Spring) 398. Design Seminar. Credit—2 hours. Students majoring in electrical and computer engineering take this course to prepare the proposal for the Capstone Design Project to be carried out in the spring semester. Students and instructor consult with design project supervisors in various areas to devise a plan. Proposal might include definition of project requirements and product specifications, clarification and verification of end user requirements, subsystem definition and interfaces, generation of project and testing plans, reliability analysis, product safety, compliance issues, manufacturability, cost, and documentation. Prerequisites: ECE 111, 112, 113, 114. Required of all electrical and computer engineering students. Must have at least junior standing and be taking the first course in a concentration sequence. (Fall of junior year) 399. Junior Seminar. Credit—2 hours. Study of ethical, social, economic, and safety considerations that arise in engineering practice by discussion of appropriate novels, movies, essays, videos, and other materials. Presentations by outside speakers. Required of all electrical and computer engineering students.


Paul D. Funkenbusch, Ph.D. (Michigan Tech.) Professor of Mechanical Engineering and of Materials Science  *Roger F. Gans, Ph.D. (California, Los Angeles) Professor of Mechanical Engineering  *Victor L. Genberg, Ph.D. (Case Western Reserve) Professor of Mechanical Engineering  Sheryl M. Gracenski, Ph.D. (California, Berkeley) Professor of Mechanical Engineering and of Biomedical Engineering  John C. Lambropoulos, Ph.D. (Harvard) Professor of Mechanical Engineering and of Materials Science, and Senior Scientist in the Laboratory for Laser Energetics; Director of Materials Science Program  James C. M. Li, Ph.D. (Washington) Albert Arndt Hopeman Professor of Mechanical Engineering and Professor of Materials Science  Robert L. McCrory, Jr., Ph.D. (M.I.T.) Professor of Mechanical Engineering and of Physics and Astronomy, and Senior Scientist in the Laboratory for Laser Energetics; Vice Provost and Director and CEO of the Laboratory for Laser Energetics  David D. Meyerhofer, Ph.D. (Princeton) Professor of Mechanical Engineering, and of Physics, and Senior Scientist in the Laboratory for Laser Energetics; Assistant Director of Laboratory for Laser Energetics  Renato Perucchio, Ph.D. (Cornell) Professor of Mechanical Engineering and of Biomedical Engineering and Associate Professor of Pediatrics  *David J. Quesnel, Ph.D. (Northwestern) Professor of Mechanical Engineering and of Materials Science  *John H. Thomas, Ph.D. (Purdue) Professor of Mechanical and Aerospace Sciences and of Astronomy  Richard E. Waugh, Ph.D. (Duke) Professor of Pharmacology and Physiology, of Biochemistry and Biophysics, of Mechanical Engineering, and of Biomedical Engineering  Amy Lerner, Ph.D. (Michigan) Associate Professor of Biomedical Engineering and of Mechanical Engineering  Ahmet Becene, Ph.D. (Rochester) Adjunct Assistant Professor of Mechanical Engineering  Valeri Goncharov, Ph.D. (Rochester) Adjunct Assistant Professor of Mechanical Engineering and Scientist in the Laboratory for Laser Energetics  Andrei Maximov, Ph.D. (Lebedev, Russia) Adjunct Assistant Professor of Mechanical Engineering and Scientist in the Laboratory for Laser Energetics  Chuang Ren, Ph.D. (Wisconsin-Madison) Assistant Professor of Mechanical Engineering and of Physics  Ping Zhu, Ph.D. (Rochester) Adjunct Assistant Professor of Mechanical Engineering  Craig Ronald, M.S. (Rochester) Associate Lecturer in Mechanical Engineering  Justin Gao, Ph.D. (Northwestern) Lecturer in Mechanical Engineering

MECHANICAL ENGINEERING

Riccardo Betti, Ph.D. (M.I.T.) Professor of Mechanical Engineering and of Physics, and Senior Scientist in the Laboratory for Laser Energetics  *Stephen J. Burns, Ph.D. (Cornell) Professor of Mechanical Engineering and of Materials Science  *Alfred Clark, Jr., Ph.D. (M.I.T.) Professor of Mechanical Engineering, of Biomedical Engineering, and of Mathematics

*Licensed professional engineer  †Part-time.
Leonard M. Goldman, Ph.D. (Rochester)  
Professor Emeritus of Mechanical Engineering  

*Albert Simon, Ph.D. (Rochester)  
Professor Emeritus of Mechanical Engineering and  
of Physics and Senior Scientist in the Laboratory for Laser Energetics

The Department of Mechanical Engineering offers an undergraduate program leading to the degree of bachelor of science in mechanical engineering and a program leading to the degree of bachelor of science in geomechanics. The program in geomechanics is described on page 156.

The following mission statement and the goals of the program were approved in January 2003 as part of our continuing review. The faculty view both the mission statement and goals of our program as results of continual evaluation and assessment. Updated, current versions may be found in the Web pages of the Department of Mechanical Engineering (www.me.rochester.edu).

**MISSION OF THE PROGRAM IN MECHANICAL ENGINEERING**

The mission of the Bachelor of Science program in mechanical engineering at the University of Rochester is to educate able, creative, responsible engineers capable of assuming leadership roles in their profession. The department offers a rigorous academic program designed to prepare students for engineering practice, graduate study, and a lifetime of continued learning. The curriculum is based on a firm foundation of basic science, applied mathematics, and engineering sciences, and includes significant experience in experimental work and in the analysis, design, and development of mechanical and thermal systems. The program aims to enhance the leadership and communication skills needed to excel in professional life and to promote an understanding of the broad social and economic impacts of engineering.

**GOALS OF THE PROGRAM IN MECHANICAL ENGINEERING**

1. To produce competent mechanical engineers employed in a wide variety of technical areas in the local, national, or international engineering job markets.  
2. To prepare graduates who realize the value of continuing their education with a view toward careers in industry, research, business, or academia.  
3. To educate articulate engineers who can see their engineering work in a larger social-political context for today’s complex, global, international responsibilities.

**PROGRAM IN MECHANICAL ENGINEERING**

Mechanical engineers are among the most versatile, flexible, and broadly based engineers in the profession. Our students acquire knowledge in fields of energy, material properties, fluid mechanics, solid mechanics, dynamics, laboratory technique, design methodology, and system analysis. Our graduates apply their skills in jobs requiring engineering design, development, manufacturing, research, and resource management.

The University of Rochester has offered an undergraduate degree in mechanical engineering for nearly 100 years. This program provides effective preparation for students who enter industry immediately upon graduation as well as excellent background for graduate study in engineering and other fields.

The curriculum provides a balance of courses in the humanities and social sciences, physics, applied mathematics, and basic engineering. Emphasis is placed on the underlying fundamentals in the required engineering coursework, enabling graduates to adapt throughout their careers to rapid advances in science and technology. Training in the design process gradually supplements the analytical content of the courses as the undergraduate progresses. Our laboratory and design courses emphasize teamwork. Formal oral and written presentations are key elements of these projects. A required senior year sequence in design acts as a capstone course in this process.

Many undergraduates in the department assist faculty members in research projects during the academic year and the summer. This work can lead to publication in the professional archival literature. It is encouraged for those students so inclined. Recent projects involving undergraduates include experiments in controlled nuclear fusion using high-powered lasers, use of the electron microscope and testing machines to study engineering materials, mechanics of soldered and welded joints, studies in human microcirculation, experimental studies in optics manufacturing, modeling crystal growth, and experiments on non-linear dynamical systems.

**CURRICULUM**

The B.S. degree requires 130 credit hours, divided among science, mathematics, engineering, humanities, and social sciences. The required engineering courses are shown below in the four-year-degree program in mechanical engineering. There is an introductory course in engineering graphics; a sequence in mechanics, ME 120, 121, 226, 213; a sequence in energy and fluids, ME 123, 223, 225, 251; a materials course, ME 280; a laboratory in materials and solids, ME 242; and a laboratory in fluid dynamics and thermal systems, ME 241.

Computational skills are absolutely necessary for modern engineering, and we distribute such training in many of the required curriculum courses, as well as in a junior-level course in modern numerical methods, ME 211. All these are capped by the senior advanced design sequence, ME 204, 205. Students are required to take an introductory course in electrical circuits.

For admission to the mechanical engineering major, the student must have completed the first two years as listed in the four-year degree program below. In addition, the student must have attained a grade-point average of 2.0 or better in all mechanical engineering courses taken, and an overall grade-point average of 2.0 or better.

For graduation, concentrators in the department must obtain a cumulative average of 2.0 or higher for all required mechanical engineering courses, and an overall grade-point average of 2.0 or higher.

Students are encouraged to join and be active in the student chapter of ASME, the professional society for mechanical engineers. In addition, seniors are encouraged to take Part A of the New York State Professional Engineering License examination.

**ELECTIVES**

Our program has one required technical elective and one required natural science elective. There are also three free electives, in addition to the five required distribution electives in the humanities and social sciences. These may be used to make it easier to minor in an approved field in the humanities or social sciences, acquire a language, take graduate courses in engineering, acquire some business/management skills, or generally broaden the undergraduate experience.

**DISTRIBUTION REQUIREMENTS**

In addition to the required primary writing course, students must take four courses in the humanities or social sciences. Three of these courses must constitute a cluster. The Accreditation Board for Engineering and Technology specifies that distribution requirements meet certain conditions. The first condition is that the set of courses taken must exhibit some depth, and cannot all be at the introductory level. This condition is normally satisfied by a cluster. The second condition is that courses dealing only with routine skills or exercises of personal craft are not suitable distribution requirements.

**ACCREDITATION**

Each student is assisted by a faculty advisor in planning a program of study. In making specific course selections, each student is required to satisfy not only the course requirements given below, but also the minimum professional accreditation requirements of the Accreditation Board for Engineering and Technology. Faculty advisors should be consulted to be sure that all such requirements are met.

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*Licensed professional engineer*
STANDARD FOUR-YEAR PROGRAM
Below is the standard four-year program for students who decide on a mechanical engineering major in their first year. The basic mechanics course ME 120 is offered every semester. This allows an alternative four-year program for students entering the mechanical engineering major in the sophomore year.

First Year

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<thead>
<tr>
<th>Course</th>
<th>Credit (Hours)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>MTH 161</td>
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<td>PHY 121</td>
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<td>ME 121</td>
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<td>ME 203</td>
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<td>ME 205</td>
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Second Year

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<tr>
<th>Course</th>
<th>Credit (Hours)</th>
<th>Notes</th>
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<tr>
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<tr>
<td>ME 121</td>
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<td>ME 223</td>
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<td>Cluster course</td>
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<td>CAS 105</td>
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<td>ME 110</td>
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Third Year

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<tr>
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<td>ME 121</td>
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<td>ME 223</td>
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<td>ME 110</td>
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Fourth Year

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<th>Course</th>
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<tr>
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<td>ME 242</td>
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<td>ME 251</td>
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MINOR IN MECHANICAL ENGINEERING
A minor in mechanical engineering is available to the nonmajor an opportunity to study some of the main ideas of modern engineering and acquire the skills necessary to implement them. The interested student should plan a focused program of study with any mechanical engineering faculty member. The requirements for a minor in mechanical engineering are as follows:

- The student must attain passing grades in four ME courses at the 200 level or higher. The minimal acceptable GPA for these courses is 2.0.
- The student’s program of study must include at least one of the following courses: ME 204, 205, 211, 241, 242, or 251.

In preparation for the upper-level mechanical engineering courses, a student would normally take two of the introductory courses ME 120, 121, 123, or their equivalents.

UPPER-LEVEL WRITING REQUIREMENT
Upper-level writing requirements are satisfied by the required writing components of the laboratory project and design courses required of all majors.

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<th>Course</th>
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<td>ME 120</td>
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<td>ME 123</td>
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<td>ME 242</td>
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<td>ME 251</td>
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COURSES OF INSTRUCTION
Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

104Q. Life’s Structures: Mechanical Design in Nature and in the Technological World. Mechanical aspects of design in the context of two areas in which most students have a very good intuitive understanding: structures built and used by humankind over the centuries and human and animal bodies. We examine how Newtonian mechanics, material behavior, energy requirements, size, and dimensional considerations define the boundaries of mechanical design in nature and in human technology. On the side of technology, the course studies the evolution of masonry buildings, of bridges, and of other structures. In the case of biological design, topics include bones and the skeletal system, the heart and the circulatory system, muscles and soft tissues. Students work in teams on several design projects, including written reports, model constructions, poster presentation.

105. Roman Structures: Engineering in the Classical World. A study on location of Roman engineering focused primarily on civil engineering structures, but also including topics in mechanics, hydraulics, and materials. Modern theories in structural mechanics and strength of materials are used to analyze the practice, the achievements, and the limitations of Roman engineering. Topics include the development of structural form in antiquity, building and manufacturing techniques, construction machines and war implements, bridges, aqueducts, monumental buildings, vaults, and domes. The course begins with a mandatory three-weeklong program of study-on-location in Italy during the month of August, which includes extensive visits to Roman monuments, archeological sites, and museums in Rome. This course is part of a new interdisciplinary program between the Department of Mechanical Engineering and the Department of Religion and Classics. An additional program fee is required. Same as CLA 213.


163. Applied Differential Equations. Linear first-order equations; separable first-order equations; direction fields and elementary numerical methods. General theory of linear second-order equations; equations with constant coefficients; inhomogeneous equations; detailed treatment of oscillators, including damping, forcing, and resonance. Introduction to nonlinear equations and phase plane methods. Extensive treatment of applications in engineering and science. Prerequisite: MTH 143 or 162.

164. Applied Vector Calculus and Linear Algebra. Review of vector algebra; scalar and vector fields; gradient, curl, and divergence; curves; surfaces; line integrals; surface integrals; Gauss’ theorem; Stokes’ theorem. Systems of linear equations; matrices and matrix algebra; matrix rank; vector spaces; eigenvalues and eigenvectors. Extensive treatment of applications in engineering and science. Prerequisite: MTH 143 or 162.

201. Applied Boundary-Value Problems. Formulation of partial differential equations for physical problems; Fourier series; separation of variables leading to Fourier series; Sturm-Liouville theory; eigenfunction expansions and separation of variables; Fourier transform; similarity methods; Fourier-Bessel expansions and separation of variables in cylindrical coordinates; Legendre polynomials and separation of variables in spherical coordinates. Equations dealt with in the course are the Laplace equation, the heat equation, the wave equation, and related equations. Applications are to such areas as heat conduction, fluid flow, electromagnetic theory, acoustics, and quantum mechanics. Cross-listed with MTH 281. Prerequisites: M/MTH 163, 164.

202. Applied Complex Variables. Complex numbers and the complex plane; analytic functions; elementary functions; complex integration; series expansions; residue theory; multi-valued functions; Laplace transform and complex inversion. Applications treated include the following: use of complex functions in oscillation theory; evaluation of real integrals by contour integration; numerical representation of functions by series; solution of ordinary differential equations by power series; solution of Laplace equation in two dimensions; solution of ordinary and partial differential equations by Laplace transform. Cross-listed with MTH 282. Prerequisites: M/MTH 163, 164.

machines. Generalized forces, virtual work. Applications to reciprocating engines. Mechanism design project. Prerequisites: ME 120, 121.

204. Mechanical Design. The theory and application of structural mechanics to mechanical design. Topics include matrix structural analysis and finite element techniques. Students use the NASTRAN finite element program to solve a variety of design and analysis problems. The term project consists of a team competition to design, analyze, build, and test a lightweight structure. Prerequisite: ME 226 (ME 211 recommended).

205. Advanced Mechanical Design. This course follows ME 204 in the study of mechanical components and analysis models. There is an emphasis throughout on the use of the computer to obtain solutions and to achieve optimization. There is a semester-long team design project. Historically, design topics have been drawn from local industry and superior student designs have been built by the corporate sponsors. Prerequisite: ME 204.


213. Mechanical Systems. Free and forced vibration in one, two, and many degrees-of-freedom systems. Complex representation, damping, matrix methods, applications. Continuous systems; string and beam vibration. Prerequisites: ME 121, 226; ME/MTH 163, 164.

222. Introduction to Robust Design and Quality Engineering. Definition and pursuit of “quality” as a design criterion; ideas of Taguchi and others. The concept of robust design. Selection of the quality characteristics and experimental design to improve quality. Prerequisite: ME/MTH 164 or equivalent.


225. Introduction to Fluid Dynamics. Dimensional analysis, kinematics, Bernoulli’s theorem, potential flow, vorticity, viscous flow, pipe flow, boundary layers, instability and turbulence. Prerequisites: ME/MTH 163, 164; ME 120, 123.


227. Applied Fluid Dynamics. Selected topics in fluid dynamics as applied in engineering practice. Topics include pipe flow, pipe networks, open-channel flow, flow in turbines and pumps, low-speed aerodynamics, drag reduction, and hydrodynamic lubrication. Assignments include design of fluid components and systems. Individual design projects. Prerequisite: ME 225.

241. Fluid Dynamics Laboratory. Introductory lectures on lab practice and data analysis. The first part of the lab uses simple experiments to familiarize the student with different instruments used in fluid dynamics, heat transfer, and heat power. In the second part, students (working in groups of three) perform experiments designed by them. Reports are given both orally and in writing. Prerequisite: ME 225.

242. Materials and Solids Laboratory. Fundamentals of experimentation, including instrumentation, data analysis, and reporting. Lectures, short instrumentation labs, and an independent project. Prerequisites: ME 121, 226, 228.

251. Heat Power Applications. Power cycles, engines, compressors and turbines, refrigeration cycles, air conditioning, direct energy conversion, energy storage, and combustion. A design project is included. Prerequisites: ME 123, 225 (may be taken concurrently).

252. Modern Energy Conversion. Conversion of chemical and nuclear energy into mechanical and electrical energy: Energy sources and their projected use. Conventional electric power generation, thermoelectric and thermionic systems and fuel cells, fission, controlled fusion, and magnetohydrodynamic power generation. Design project. Prerequisite: ME 123.

253. Nuclear Engineering. Nuclear structure, nuclear reactions, fission, nuclear power plants, neutron diffusion, reactor theory, reactor kinetics. Team design project. Prerequisites: PHY 125, ME 123.

254. Finite Elements. The theory and application of finite element analysis in structural mechanics and other disciplines. Topics: matrix analysis concepts; element formulation methods; element behavior and geometry; global analysis aspects; isoparametric elements; elements for continuum problems. Prerequisite: ME 226.

280. Introduction to Materials Science. Relationship between microstructures of solid materials and their engineering properties. The dependence of mechanical, electronic, magnetic, thermal, and chemical properties of metals, semiconductors, ceramics, polymers, and glasses on their chemical bonding, electronic structure, atomic arrangement, and phase composition. Prerequisites: ME/MTH 163, 164; PHY 123.

OPTICS

Govind P. Agrawal, Ph.D. (Indian Institute of Technology) Professor of Optics and of Physics and Senior Scientist in the Laboratory for Laser Energetics
David Berg, M.S. (Rochester) Adjunct Professor of Optics
Nicholas P. Bigelow, Ph.D. (Cornell) Lee A. DuBridge Professor of Physics and Professor of Optics and Senior Scientist in the Laboratory for Laser Energetics
Robert W. Boyd, Ph.D. (California, Berkeley) Professor of Optics and Senior Scientist in the Laboratory for Laser Energetics
Joseph H. Eberly, Ph.D. (Stanford) Carnegie Professor of Physics and Professor of Optics
Philippe Fauchet, Ph.D. (Stanford) Professor of Optics and Scientific Director in the Laboratory for Laser Energetics
James R. Fienup, Ph.D. (Stanford) Robert E. Hopkins Professor of Optics, Professor in the Center for Vision Science, and Senior Scientist in the Laboratory for Laser Energetics
Thomas Foster, Ph.D. (Rochester) Professor of Imaging Sciences, of Optics, and of Physics
Nicholas George, Ph.D. (California Institute of Technology) Wilson Professor of Electronic Imaging and Professor of Optics and of Electrical and Computer Engineering
Douglas Goodman, Ph.D. (Arizona) Adjunct Professor of Optics
Stephen D. Jacobs, Ph.D. (Rochester) Senior Scientist in the Laboratory for Laser Energetics and Professor of Optics, of Chemical Engineering, and of Materials Science
Wayne H. Knox, Ph.D. (Rochester) Professor of Optics and Senior Scientist in the Laboratory for Laser Energetics; Director, The Institute of Optics
Duncan T. Moore, Ph.D. (Rochester) Rudolf and Hilda Kingslake Professor in Optical Engineering Science and Professor of Optics, of Biomedical Engineering, and of Business Administration in the William E. Simon Graduate School of Business Administration; Vice Provost for Entrepreneurship
Lukas Novotny, Dr. Sc. Techn. (Swiss Federal Institute of Technology) Professor of Optics, of Physics, and of Biomedical Engineering and Senior Scientist in the Laboratory for Laser Energetics
Carlos R. Stroud, Jr., Ph.D. (Washington) Professor of Optics and of Physics
Kenneth J. Teegarden, Ph.D. (Illinois) Professor of Optics
Ian A. Walmsley, Ph.D. (Rochester) Adjunct Professor of Optics
Gary Wicks, Ph.D. (Cornell) Professor of Optics; Associate Director, The Institute of Optics
David R. Williams, Ph.D. (California, San Diego) William G. Alyn Professor of Medical Optics, Professor of Brain and Cognitive Sciences, of Optics, of Ophthalmology, and of Biomedical Engineering; Director, Center for Visual Science
Emil Wolf, Ph.D. (Bristol), D.Sc. (Edinburgh) Wilson Professor of Optical Physics and Professor of Optics
Andrew J. Berger, Ph.D. (M.I.T.) Associate Professor of Optics and of Biomedical Engineering
Thomas G. Brown, Ph.D. (Rochester) Associate Professor of Optics and Scientist in the Laboratory for Laser Energetics
Chunlei Guo, Ph.D. (Connecticut) Associate Professor of Optics
John Marcian, Ph.D. (Rochester) Associate Professor of Optics and Scientist in the Laboratory for Laser Energetics
Wolf Seka, Ph.D. (Texas) Senior Scientist in the Laboratory for Laser Energetics and Associate Professor of Optics
James M. Zavislak, Ph.D. (Rochester) Associate Professor of Optics, of Dermatology, of Ophthalmology, and of Biomedical Engineering; Director, Institute Ventures
Miguel A. Alonso, Ph.D. (Rochester) Assistant Professor of Optics
Julie Bentley, Ph.D. (Rochester) Adjunct Assistant Professor of Optics
Dale Buralli, Ph.D. (Rochester) Adjunct Assistant Professor of Optics
Jennifer Kruschwitz, M.S. (Rochester) Adjunct Assistant Professor of Optics
James Oliver, M.S. (Rochester) Adjunct Assistant Professor of Optics and Research Engineer in the Laboratory for Laser Energetics
Brian J. Thompson, Ph.D. (Manchester) Provost Emeritus and Distinguished University Professor and Professor Emeritus of Optics
M. Parker Givens, Ph.D. (Cornell) Professor Emeritus of Optics
Robert E. Hopkins, Ph.D. (Rochester) Professor Emeritus of Optics

Optics is the subject that deals with the generation, propagation, detection, manipulation and application of light. Having awarded the nation's first B.S. degree in optics in 1932, the University of Rochester's Institute of Optics has established itself as one of the world's leading centers for teaching and research in the rapidly expanding field of optics. The invention of the laser in 1960 and other important developments opened up many new possibilities, including fiber-optic communications, holography, optical information storage (CD technology, for example), electronic imaging, and more, so that today, optics has become one of the technological pillars of modern society. Optics also contributes much to modern science, figuring prominently in a number of recent Nobel prizes.

Rochester students completing the B.S. in optics in recent years have chosen to pursue graduate studies in optics, physics, electrical engineering, or biomedical engineering; to accept positions as optical engineers in the thriving optics industry; to work in engineering sales; to attend medical school or law school; or to enter a business program to pursue an M.B.A. In addition to traditional career directions, medicine and law offer significant opportunities today for someone with a background in optics. Optical instrumentation and techniques are becoming very important in medical research and medical practice, so an M.D., or an M.D./Ph.D., with a B.S. in optics is uniquely educated to become a key participant in these emerging areas. Likewise, because of the strong entrepreneurial spirit of the optics community, a patent attorney with a B.S. in optics can establish a very active practice.

The optics curriculum provides the depth and breadth needed to prepare for a variety of career options. The foundations of optics are covered by the required coursework, including lasers, geometrical and physical optics, electromagnetic theory, quantum mechanics, and optical and optoelectronic devices, instruments, and measurement techniques. Optics majors can supplement their required coursework with a number of electives to tailor their programs to their specific interests. The faculty encourages optics majors to become involved in the world-class research programs that are a distinctive part of The Institute's culture.

Students may also gain experience in engineering project planning and execution via an honors project or internship. These are designed to help students translate knowledge acquired in the classroom to practical applications.

ADMISSION REQUIREMENTS

Students normally apply for admission to The Institute of Optics at the end of the sophomore year by submitting a concentration approval form to their advisor or to the chair of the Undergraduate Committee. Admission requirements are as follows: (1) an overall grade-point average of at least 2.0; (2) a grade-point average of at least 2.0 in PHY 121, 122, or 142, and 123 or 143, or in those courses taken to fulfill the physics requirement; (3) a grade-point average of at least 2.0 in MTH 161, 162, 163 or 165, and 164, or in those courses taken to fulfill the math requirement; (4) a grade of C or better in each of OPT 241 and 261; and (5) completion of CAS 105 with a grade of C or better. For graduation, a minimum cumulative grade-point average of 2.0 is necessary for all courses taken in The Institute of Optics, as well as an overall average of 2.0. Additionally, a student must have at least 130 credit hours completed upon graduation.

Prospective students and undergraduates considering optics as a major are encouraged to write or to visit The Institute of Optics for more information and individual counseling.
FOUR-YEAR PROGRAM

First Year
- MTH 161
- CHM 131
- CAS 105
- OPT 101
- Cluster course

Second Year
- MTH 163
- PHY 122 or 142
- OPT 211
- Cluster course

Third Year
- OPT 242
- OPT 224
- MTH 281
- Cluster course

Fourth Year
- OPT 226
- OPT 256
- Elective (tech. or free)
- Cluster course

OPTICS elective

Second Year
- OPT 241
- OPT 261
- Cluster course

Third Year
- OPT 242
- OPT 224
- MTH 281
- Cluster course

Fourth Year
- OPT 226
- OPT 256
- Elective (tech. or free)
- Cluster course

Fourth-Year—Plan B (without thesis)
- OPT 461 or 441
- OPT 462 or 442
- Elective (Optics)
- Elective (Optics)

Fourth-Year—Plan A (with thesis)
- OPT 461 or 441
- OPT 442 or 462
- OPT 491
- OPT 495

MINOR IN OPTICS

B.S.-M.S. PROGRAM IN OPTICS

Upper-Level Writing Requirement

Courses of Instruction

Technical Electives

Optics Honors Program

Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

101. Optics in the Information Age.

Courses 196, 197, 198, and 199 are one-credit laboratory courses designed to complement the classroom material offered in the first three years. These laboratories emphasize practical problem solving, measurement, and presentation skills in various aspects of geometrical optics, physical optics, metrology and photonics/optoelectronics.

196. This course is intended to supplement OPT 101 during the fall semester. It is not required for the optics major, but first-semester freshmen are encouraged to enroll.

197. This course accompanies OPT 241 in the spring semester and is normally taken during the first year. It is a required course for undergraduate optics majors.
198. This course accompanies OPT 261 in the spring semester and is normally taken during the second year. It is a required course for undergraduate optics majors.

199. This junior-level course emphasizes laboratory skills in optical metrology and various topics in optoelectronics/photronics.

211. Computational Methods in Optics. This course introduces techniques of transforming continuous problems to discrete mathematical models. Students learn computational methods for solving problems in optics using high-level software. Includes labs. Prerequisites: MTH 162 and concurrent enrollment in MTH 164.


224. Laser Systems. Optical devices including lasers, modulators, and optical wave guides. Emphasis is placed on developing the basic principles needed to design new devices, as well as an understanding of the operation of those currently in use. Prerequisite: some knowledge of simple quantum mechanics and scalar diffraction theory is assumed. Optics majors should have taken OPT 241 and 261. MTH 163 is recommended.


232. Optomechanical Design. Concepts required to achieve goals of optical system performance, combining of glass with metal or plastic, kinematic design, material limitations, effects of gravity and temperature. Applications to optical metrology, alignment, geometry 2-D and 3-D, and generation of precision diffraction gratings. Standards for straightness, flatness, roundness, and length.


243. Optical Fabrication and Testing Laboratory. Credit—2 hours. Fabrication of a plane parallel plate, lens, or prism from a variety of optical glasses; controlled loose abrasive grinding and pitch polishing skills; optical metrology; including interferometry and evaluation of roughness. Optics seniors only (or with permission of instructor).


252. Colorimetry. Principles and uses of CIE system of colorimetry, additive and subtractive color-mixture calculations, color-difference evaluation, uniform color scales, chromatic adaptation, computer colorant formulation, metameric colors, color-rendering properties of light sources.

256. Optics Laboratory. Intensive laboratory course with experiments on optical imaging systems, testing of optical instruments, diffraction, interference, holography; lasers, detectors, spectroscopic instruments. Prerequisites: OPT 242, 261, and 262.

261. Interference and Diffraction. Complex representation of waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; diffraction and image formation; optical transfer function; coherent optical systems, optical data processing, and holography. Prerequisites: MTH 164 and PHY 122 or 142.

262. Electromagnetic Theory. Vector analysis, Maxwell’s equations, energy flow in electromagnetic fields, dipole radiation from Lorentz atoms, partially polarized radiation, spectral line broadening, dispersion, reflection and transmission, crystal optics, electro-optics, quantum optics. Prerequisites: MTH 163, 164, PHY 122 or 142, and PHY 123 or 143.

263K. Quantum Optics Laboratory. A study of several applications including entanglement and Bell’s inequalities, single-photon interference, single-emitter confocal fluorescence microscopy, among others; over four laboratory experiments culminating with an oral presentation and examination of photonics-based quantum computing and quantum cryptography. Students also devise a full-fledged potential business plan based on the implementation of this technology.

287. Mathematical Methods for Optics and Physics. A capstone course to examine the mathematical tools necessary for physics and optics in order to gain insight and experience in their application. Prerequisites: MTH 161–164 or 165, MTH 281.

300. Current Optics and Optical Technology. A survey of advanced experimental and theoretical methods of modern optics, conducted as a series of seminars by experts from the faculty and industry. The objective of this course is to prepare students for careers in optical science or engineering by providing a broadly-based overview of current technology and techniques in optics. Prerequisites: OPT 224, 241, 242, 256, 261, and 262.

307. SEM Practicum. A closely supervised training in use of the scanning electron microscope.

391. Independent Reading.

392. Special Topics. Current offerings include Guided Wave Optics, and Solid-State Physics and Optical Materials. (Course descriptions and a complete listing are available from the Office of Undergraduate Affairs at The Institute of Optics.)

393. Special Essay.

395. Undergraduate Research Projects.

396. Honors Project. Reading or research course open by special permission to seniors in optics.

*Admission is normally limited to those students enrolled in the five-year optics B.S.-M.S. program.
INTERDISCIPLINARY PROGRAMS

GEOMECHANICS

PROGRAM ADVISORS
†Roger F. Gans, Ph.D. (California, Los Angeles) Professor of Mechanical Engineering
John Tarduno, Ph.D. (Stanford) Associate Professor; Chair, Earth and Environmental Sciences

The program in geomechanics is a joint offering of the Department of Earth and Environmental Sciences and the Department of Mechanical Engineering, and leads to the degree of bachelor of science in geomechanics. The program provides an unusual opportunity for students interested in the quantitative aspects of the earth sciences.

The curriculum emphasizes the application of the principles of mechanics to problems associated with the atmosphere, the oceans, and the solid earth. The program is a natural blend between the two departments and builds on several areas common to engineering and to quantitative earth sciences: the mechanics of fluids, the mechanics of solids, and the properties of materials.

Students who successfully complete this program will be well equipped for employment or graduate studies in a number of fields, such as civil and other engineering disciplines, geology and geophysics, hydrology, engineering geology, and other related fields. Career opportunities include work with the U.S. Geological Survey and with departments of natural resources or environmental protection at the federal, state, and county levels, with the oil and mineral resource industries, and in multidisciplinary private consulting firms engaged in geological engineering.

CURRICULUM
The geomechanics curriculum is built around basic mathematics, physics, chemistry, earth and environmental sciences, and engineering courses. The required earth and environmental sciences courses cover geologic processes, the evolution of the earth, mineralogy, and structural geology. Required engineering courses deal with basic mechanics, thermodynamics, fluid mechanics, and solid mechanics.

Technical electives, chosen from a number of earth and environmental sciences and engineering offerings, include courses in geophysical fluid dynamics, optical mineralogy, advanced mechanics, heat transfer, rheology, rock mechanics, materials science, geophysics, sedimentary processes, and laboratory studies.

The program also allows three free electives, which each student may choose to suit his or her special interests. For example, a student can elect to study environmental problems by taking courses in air and water pollution and in ecology. Training in environmental planning and policy work may be obtained by taking courses in earth and environmental sciences and public policy, environmental decisions and operations research. Many other special programs can be developed in such areas as water resources problems, advanced fluid dynamics of atmospheres and oceans, or advanced rock mechanics and structural geology.

The student is encouraged to approach faculty regarding projects of interest. For preparation in mathematics, the program requires MTH 161, 162, ME/MTH 163, and ME/MTH 164 (or the equivalent five-course sequence: MTH 141, 142, 143, ME/MTH 163, 164). The required physics courses are PHY 121, 122, and 123, and the required chemistry course is CHM 131. In earth and environmental sciences, EES 101, 201, 204, and 208 are required; and in mechanical engineering, the requirements are ME 120, 123, 225, 226, and either 241 or 242.

In addition to the above courses, there are four technical electives, which may be any of the earth and environmental sciences or mechanical engineering courses at the 200 level or higher, and one technical elective from any discipline, as agreed upon with the faculty advisor.

The program includes three free electives to allow a strong minor in an area of particular interest to the student, or to broaden the scope of the curriculum. Other general degree requirements, including distributive requirements, are those listed below.

ADMINISTRATION
The geomechanics degree is awarded by the College in either arts and sciences or engineering and applied sciences—the choice is made by the student. If the student chooses arts and sciences, his or her major advisor will be in the Department of Earth and Environmental Sciences; if the degree is to be granted through engineering and applied sciences, the major advisor will be in the Department of Mechanical Engineering. In each case, the student will also have a minor advisor in the other department.

Below is a sample arrangement of courses. Considerable variations on this ordering are possible to accommodate transfers and special needs.

FOUR-YEAR PROGRAM IN GEOMECHANICS

First Year
MTH 161† MTH 162†
EES 101 PHY 121
CAS 105 ME 120
(Primary Writing) Elective (cluster)
Elective

Second Year
MTH 163 MTH 164
PHY 122, 181 PHY 123
Elective (cluster) ME 125
Elective EES 201

Third Year
CHM 131 Elective (technical)
ME 225 ME 226
Elective (technical)† PHY 183
Elective (technical)‡ Elective (cluster)
Elective (cluster)

Fourth Year
EES 208 EES 204
Elective (technical)† Elective (technical)‡
Elective (cluster)
Elective (technical)‡
Elective (cluster)

INTERDEPARTMENTAL PROGRAMS

PROGRAM COMMITTEE
Robert C. Waag, Ph.D. (Cornell) Yates Professor of Engineering, Professor of Electrical and Computer Engineering and of Radiology
Roger F. Gans, Ph.D. (California, Los Angeles) Professor of Mechanical Engineering
Chunlei Guo, Ph.D. (Connecticut) Assistant Professor of Optics
Jack G. Mottley, Ph.D. (Washington University) Associate Professor of Electrical Engineering; Chair of the Program
Mitchell Anthamatten, Ph.D. (M.I.T.) Assistant Professor of Chemical Engineering and Scientist in the Laboratory for Laser Energetics
Kevin Davis, Ph.D. (Boston) Assistant Professor of Biomedical Engineering and of Neurobiology and Anatomy

BACHELOR OF SCIENCE IN ENGINEERING AND APPLIED SCIENCE

The interdepartmental degree, B.S. in Engineering and Applied Science (BS/IDE), is intended for students who have specific technical objectives not adequately addressed by the other B.S. degree programs offered by the School of Engineering and Applied Sciences (SEAS). For example, students with interests in patent law or in architectural engineering have crafted programs of study well suited to their
specific educational objectives through the Interdepartmental Program.

Within the total of 32 courses (128 credit hours) required to earn the B.S. degree (see page 136), a minimum of 18 are devoted to mathematics, other natural sciences, and engineering. (Of these, at least eight must be courses offered by SEAS.) A further nine courses, at a minimum, are devoted to satisfying the primary writing requirement, upper-level writing requirement (see this page) and two clusters, one in humanities and one in the social sciences (see page 136). The remaining courses may be free electives. Students frequently use these courses to pursue one of the many certificates offered by the University, such as the Certificate in Management Studies (page 80). They may also be used to pursue a minor in one of the disciplines in the humanities or social sciences, such as economics, philosophy, political science, or art history.

Each degree program under BS/IDE must include three sequences of technical or scientific courses. Each sequence must include at least three courses, only one of which may be at the 100 level. A sequence of courses is defined as “a logical progression of study, confined to an acceptably identifiable area, in which later material builds upon and extends earlier material.” (In rare cases, the Committee has approved the use of a nontechnical or nonscientific sequence to strengthen the focus of a program when a student wishes to study such a discipline in depth.)

A final degree requirement under BS/IDE is a senior thesis. The thesis is a coherent, written summary of independent study, in the focus area of the program, undertaken under the supervision of an appropriate member of the SEAS faculty during a student’s junior and senior years. Up to 8 credit hours of independent study may be included in a student’s program. During the second semester of the sophomore year, a prospective BS/IDE student is expected to seek out and work with an appropriate faculty member to define an area of independent study. A brief description of the topic along with the supervising faculty member’s signature is submitted by the end of the sophomore year as part of the application for admission to BS/IDE.

Students are expected to enter with and to maintain strong academic records. All students in the program must earn a minimum cumulative grade-point average of 2.0 for all courses taken in their fields of specialization. This includes all courses in their sequences as well as the eight required engineering courses. In addition, each student entering the program must have completed the following subjects with a grade-point average of at least 2.7:

- primary writing, one course;
- mathematics, three courses, including one in differential equations (usually MTH 163); chemistry and physics, four courses, at least one in each. Full details of both admissions and degree requirements under BS/IDE are provided in documents available from the Dean’s Office in 306 Lattimore Hall.

Students who are attracted to engineering and who are either unsure of specialization within the field or who have specific interests not obviously addressed by the standard programs are strongly encouraged to contact the Dean’s Office in Lattimore Hall for information on guidelines and degree requirements.

**BACHELOR OF ARTS IN ENGINEERING SCIENCE**

The B.A. in engineering science (BA/ES) is intended for students who, while not necessarily planning careers in the practice of engineering, may benefit from an enhanced technical content in their education. Technology and corresponding modes of thought are becoming ever more important in issues affecting everyone. Examples include environmental issues, such as acid rain and the greenhouse effect; issues broadly related to medicine, such as gene splicing and the proper use of life support systems; legal issues, such as privacy of records in the computer age; and new regulatory and ethical issues raised by developing technology.

The B.A. in engineering science emphasizes breadth across engineering disciplines and as such offers an exposure to technology not available via other degree programs. Thus, students considering careers in business, law, or medicine may find the B.A. program excellent preparation. The technological focus of the program may offer advantages in dealing with issues such as those listed above, when they are encountered in the role of corporate manager, lawyer, or physician. Alternatively, the program could be followed by more intense specialization in a specific engineering discipline at the master’s degree level.

Within the total of 32 courses (128 credit hours) required to earn the B.A. in engineering science, a minimum of eight courses must be in the natural sciences disciplines, including at least one course in chemistry, two in physics, and three in mathematics. The latter must include a course in differential equations (typically MTH 165). Additional courses in these or other natural science disciplines are also required. Additional course requirements include one course in computing (CSC 170 or equivalent), and at least eight courses in engineering, including at least one laboratory-intensive course. The opportunity to take courses in depth from several engineering disciplines is a unique aspect of this program.

To earn the B.A. in engineering science, students must satisfy the primary and upper-level writing requirements and also must complete two clusters, one in the humanities and one in the social sciences.

Totaling the above course requirements leaves from five to eight courses available as free electives. This permits students considerable flexibility in shaping programs that reflect personal interests.

The BA/ES program is administered by the Committee on Interdepartmental Programs. Approval of the Committee is required for each proposed program of study. Admission to the program at the end of the sophomore year requires an overall grade-point average of at least 2.0, together with completion of the following nine courses with a GPA in these nine courses of at least 2.3: one primary writing course; three math courses, including a course in differential equations; three physics and chemistry courses, including at least one course in each; and at least two engineering courses.

Programs meeting degree requirements are to be worked out in consultation with an appropriate member of the Program Committee. Interested students—including potential transfer students—may obtain information and application forms from the Dean’s Office in 306 Lattimore Hall.

**UPPER-LEVEL WRITING REQUIREMENT**

Significant writing experience in one’s discipline is an important adjunct to the technical material one learns, and that experience is gained through upper-level writing courses in which a significant weight is given to the effectiveness of written communication. For students in the B.A. in engineering sciences or the interdepartmental engineering program, the upper-level writing requirement is satisfied by taking two or more of the courses that satisfy the upper-level writing requirement in the “traditional” engineering programs. Otherwise the student and the IDE Committee will stipulate in the student’s plan where writing experience is to be gained. BME 101, 260, 396; CHE 246, 255, 273/4; ECE 111, 112, 113, 399; ME 204, 205, 211, 213, 223, 241, 242, 251; OPT 256, 300, 397 are engineering courses that can be used to fulfill the requirement for BA/ES and BS/IDE majors.
The Eastman education prepares students artistically, intellectually, and professionally for the challenging world in which musicians now live, and, importantly, instills a sense of mission about the value of music. Noted industrialist George Eastman established the school in 1921 as the first professional school within the University of Rochester, believing that a broad foundation in the liberal arts was a necessity for all musicians. Eastman’s farsighted vision is integral to the school’s central principles.

In recent years, changes in the culture and marketplace for classical music have led the Eastman School to embark on a series of educational innovations designed to educate the musician of the future. Housed in Eastman’s Institute for Music Leadership, a series of programs, certificates, and diplomas aim to motivate and educate students to discover new ways to engage audiences in diverse communities; empower students to think entrepreneurially about music careers and related professional opportunities; and challenge students to influence and direct the future course of classical music.

More than 100 highly regarded performers, composers, conductors, scholars, and educators make up the Eastman faculty. Nearly 850 students are enrolled in Eastman’s collegiate division—about 500 undergraduates and 350 graduate students. Approximately 2,000 applications are received each year, and about 125 freshmen and 125 graduate students are admitted. Students come from almost every state, and nearly 25 percent are from Canada and other countries.

All undergraduates have a performance concentration in one of the following: bassoon, cello, clarinet, double bass, euphonium, flute, guitar, harp, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice.

Eastman offers the following bachelor’s, master’s, and doctoral degrees:

- Bachelor of Music: composition; applied music; musical arts; music education; jazz studies
- Master of Music: composition; music education; musicology; ethnomusicology; theory; theory pedagogy
- Master of Music: jazz studies and contemporary media (performance and writing skills); performance and literature; opera (performance and stage directing); early music (emphasis in historical plucked instruments)
- Doctor of Musical Arts: composition; performance and literature; music education; conducting; piano accompanying and chamber music; jazz studies and contemporary media; early music (emphasis in historical plucked instruments)
- Doctor of Philosophy: composition; music education; musicology; theory

Additionally, the Eastman School and the University’s College together produce a variety of ways in which undergraduates at Rochester can choose to study music, often in combination with other fields. The Bachelor of Arts with a concentration in music, while based within the College on the University’s River Campus, is offered in cooperation with Eastman. The B.A. student majoring in music has access to the full range of resources of both a major private university and one of the world’s leading music schools. The program has extraordinary opportunities for students who wish to pursue musical interests as the core of a liberal arts education.

Qualified College students may study privately at Eastman for no additional tuition charge. College music majors have a wide selection of Eastman courses from which to choose for elective credit. Or a student may combine music and non-music study by actually applying to and completing two different degrees simultaneously (such as a B.M. in voice performance at Eastman and a B.A. in German at the College).

Choosing between these options can be challenging. The Office of Admissions at Eastman and the College Department of Music are wonderful sources of information for students contemplating a combined course of study at Eastman and at the College, or needing clarification on the differences between degree programs.

For all students at the University, as well as residents of the Rochester community, the Eastman School serves as a rich and vibrant resource. More than 700 performances (including concerts, recitals, and operas), most of them free of charge, are offered at the Eastman Theatre, Kilbourn Hall (a superbly constructed chamber music hall), and various other sites at the Eastman campus and throughout the Rochester area. These include performances by internationally known artists as well as faculty and students.

A separate academic bulletin, available through Eastman’s Office of Admissions, fully details the Eastman School’s programs. Prospective students are also encouraged to visit the school’s Web site at www.rochester.edu/Eastman for additional information about the Eastman School, the programs, and the people; admissions forms; information on audition repertoire and scheduling; and tuition information.

Write to any Eastman office, department or faculty member at: Eastman School of Music, 26 Gibbs St., Rochester, NY 14604.

Also reach various school departments as follows:

General Eastman information: (585) 274-1000
Admissions Office: (800) 388-9695 (U.S.A. and Canada) or (585) 274-1060
Admissions e-mail: admissions@esm.rochester.edu

Recorded concert information (24 hours a day): (585) 274-1100
Community Music School: (585) 274-1400
Financial aid: (585) 274-1070
Graduate studies: (585) 274-1560
Sibley Music Library: (585) 274-1350
School of Nursing

Patricia Chiverton, Ed.D., R.N., F.N.A.P.
(Rochester) Dean, School of Nursing; Vice President, Strong Health Nursing

The mission of the School of Nursing is to improve the health of individuals, families, and communities through innovation and collaboration in the integration of research, practice, and education. The School of Nursing prepares nurses to meet the challenges of health care in the twenty-first century. Our philosophy includes beliefs about nursing, nurses, consumers, environments, health, unification, and the educational process.

We believe the profession of nursing has as its essence assisting people to attain and maintain optimal health and to cope with illness and disability. Nursing derives its rights and responsibilities from society and is, therefore, accountable to society as well as to the individuals who comprise it. The nurse functions as a caring professional in both autonomous and collaborative professional roles, using critical thinking, ethical principles, effective communications and deliberative action to render holistic care, facilitate access to health care, and aid consumers in making decisions about their health.

The consumer of nursing care may be an individual, family, group, community, or society, who all have diverse and changing needs. We believe the consumer is self-determining and has the right to an informed choice about health. All actual consumers and potential consumers, including those who are disenfranchised from the health care system, have the right of access to health care.

Environment has a significant impact on health. Any setting in which consumers function is an appropriate environment for nursing practice. Nurses must be active in social, political, and economic arenas to shape policy that creates optimal environments for maximizing health.

Health is a subjective state which includes well-being; optimal functioning in all dimensions of life: biological, psychological, social, cultural, and spiritual; effective response to a continually changing environment; and achievement of personal potential. Health is affected by illness, disability, and dysfunction. Consumers ultimately define health for themselves and make decisions regarding it.

At the School of Nursing, faculty and learners function from the perspective of the Unification Model. Nursing practice, education, and research are the three interdependent elements of this model, each element enhancing the others. Unification embodies both a philosophical approach and an organizational structure which promotes and facilitates faculty practice and strengthens operational interdependence among practice, education, and research. Research strengthens education and practice through development of the nursing knowledge base. Practice enriches both research, through generation of questions, and education, through continual application of scientific knowledge. Education empowers nurses for leadership in professional practice and research. The interaction of these elements benefits the consumer through enhancement of the quality of nursing care.

The educational climate of the School of Nursing enhances respect, collaboration, and support among learners and faculty. Learners in the School of Nursing study the scientific and theoretical dimensions of their discipline in the context of a strong liberal arts background. A rigorous professional education with the breadth and perspective of the arts and sciences prepares leaders in nursing who shape current and future responses to ethical, political, economic, health, and nursing issues. Critical thinking and decision making are basic to the delivery of health care. Consistent with the University’s mission, the School of Nursing fosters individuality, self-direction, scholarship, and commitment to lifelong learning. Continued professional learning opportunities assist nurses in developing professional expertise. Creative, flexible programming in education is essential to meet the diverse and changing needs of both the learners and the nursing profession.

Programs of the School of Nursing are registered with the State Education Department of the University of the State of New York, Professional Education, West Wing Education Building, Washington Avenue, Albany, NY 12254, (518) 486-2067. Baccalaureate and master’s programs are accredited by the National League for Nursing Accrediting Commission, 61 Broadway, 33rd Floor, New York, NY 10006, (212) 365-5555, ext. 153. Nursing students and graduates are eligible for membership in nursing organizations such as the American Nurses’ Association, the National League for Nursing, Sigma Theta Tau (the nursing honor society), and others, including specialty groups.

REQUIREMENTS FOR THE DEGREE

BACHELOR OF SCIENCE

The curriculum is designed to be more responsive to adult learners, and this is the focus of the baccalaureate nursing program.

Students are assigned an advisor when they are admitted to the University. The advisor assists students in planning an academic program to fulfill graduation requirements; counsels students concerning coursework and progression in the program; and provides resource information as needed by the individual student.

In addition to the specific courses stipulated in the degree program, students must satisfactorily complete the following:

1. A minimum total of 128 semester hours, or equivalent, of acceptable and satisfactory academic work.

2. A cumulative grade-point average of at least 2.0 for all courses taken for credit at the University of Rochester. The APNN-BS program requires a minimum grade of 73 (C+/2.0) in all required courses.

3. A minimum of 32 hours of coursework at the School of Nursing for R.N. programs (49 credit minimum for accelerated programs for non-nurses).
In compliance with New York State regulations, immunization updates are required annually for all students in health profession programs. For students taking evening courses, escort services are available to transport students to University parking lots.

Additional information about the nursing curriculum and an application may be obtained by contacting: Student Affairs Office, University of Rochester School of Nursing, Box SON, 601 Elmwood Avenue, Rochester, NY 14642-8402; (585) 275-2375; www.son.rochester.edu.

PROGRAMS

Accelerated Programs for Non-Nurses Requirements

Students apply to either the one-year Accelerated Bachelor’s Program for Non-Nurses (generalist preparation and eligibility to complete registered nurse licensure) or the three-year Accelerated Master’s Program for Non-Nurses (additional nurse practitioner preparation in one of these specialty areas: adult, family, gerontological, pediatrics or pediatrics with behavioral mental health specialization, psychiatric/mental health—adult/family, acute care, and psychiatric/mental health—child/adolescent.

GENERALIST CURRICULUM (49 CREDITS FOR 1,275 CLOCK HOURS OF EDUCATION)

- Theory: 35 credits theory = 35 credits x 1 clock hour/wk x 15 wks/semester = 525 hours didactic education
- Laboratory: 3 credits lab = 3 credits x 2 clock hours/wk x 15 wks/semester = 90 hours laboratory
- Clinical: 1 credit clinical = 11 credits x 4 clock hours/wk x 15 wks/semester = 660 hours clinical

Prerequisites

- Non-nursing bachelor’s degree with preferred GPA 3.0/4.0
- Anatomy and Physiology
- Microbiology
- Growth & Development
- Nutrition
- Statistics

Semester I—Summer (17 credits)
- NUR 370 Pathophysiology/Pharmacology (6 credits: 6 theory credits)
- NUR 362 Comprehensive Health Assessment of the Individual (3 credits: 2 theory credits; 1 lab credit)
- NUR 372 Therapeutic Interventions I (4 credits: 1 theory credit; 2 clinical credits; 1 lab credit)
- NUR 373 Nursing Science (2 credits: 2 theory credits)
- NUR 378 Genetics (2 credits: 2 theory credits)

Semester II—Fall (16 credits)
- NUR 374 Childbearing/Childrearing (7 credits: 4 theory credits; 3 clinical credits)
- NUR 375 Psychiatric Mental Health (4 credits: 2 theory credits; 2 clinical credits)
- NUR 301 Principles and Application of Evidence for Nursing Practice (4 credits: 4 theory credits)
- UR 376 Therapeutic Interventions II (1 credit: 1 lab credit)

Semester III—Spring (16 credits)
- NUR 371 Management of Care (4 credits: 3 theory credits; 1 clinical credit)
- NUR 377 Adult and Home Nursing (7 credits: 4 theory credits; 3 clinical credits)
- NUR 355 Contexts of Health (4 credits: 3 theory credits; 1 clinical credit)
- NUR 403 Ethics & Public Policy (4 credits: 4 theory credits)
- NUR 378 Genetics (2 credits: 2 theory credits)
- NUR 379 Nursing Integration (1 credit: 1 theory credit)

SPECIALIST CURRICULUM

The specialist component consists of the existing master’s curriculum and is composed of:

- Professional core courses developed to provide common substantive areas of study for students from different clinical components
- Clinical specialty courses relating more directly to one or more clinical specialties
- Restricted and free electives
- Thesis (Plan A) and non-thesis (Plan B) options. Students must elect either Plan A (Thesis) or Plan B (Comprehensive Examination) as part of their program of study. Thesis option (Plan A)—NUR 495 is a 6-credit course and pertains to preparation for and completion of the master’s thesis. Students who elect to complete a thesis register for NUR 495, and they move through the various stages of preparation of the thesis. Students who elect to complete a thesis can waive NUR 406 in lieu of 3 of the 6 required credits. In the non-thesis option (Plan B), Comprehensive Exam, successful completion of a written comprehensive examination will demonstrate students’ abilities to integrate knowledge gained through individual courses into critical thinking as Advanced Practitioners. Students are responsible for designing degree plans that meet degree requirements.

Before beginning M.S. clinical courses, students must pass NCLEX and have a minimum GPA of 2.5.

Part-time study is available.

R.N. to B.S. to M.S. Program Requirements

A combined baccalaureate-master’s degree program in nursing is available for select registered nurses with well-defined career goals.

Requirements vary by master’s specialty (the following M.S. nurse practitioner preparation programs: Adult N.P., Family N.P., Gerontological N.P., Acute Care N.P., Care of Children and Families/Pediatric N.P., Care of Children and Families/Pediatric N.P. with Behavioral Mental Health N.P., Care of Children and Families/Pediatric N.P., Care of Children and Neonatal N.P., Psychiatric/Mental Health N.P.—Adult/Family or Child/Adolescent). The arts and sciences requirements are the same as those in the R.N. to B.S. program. Two of the four core R.N. to B.S. nursing courses are replaced by graduate-level courses. Nursing elective requirements vary from 0–4 credits. For more information about this program, please contact the Office of Student Affairs, (585) 275-2375.

COURSES OF INSTRUCTION

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

301. Principles and Application of Evidence for Nursing Practice. This course provides an introduction to evidence-based practice and the critical appraisal of best evidence literature. Students learn to formulate clinical questions in answerable format, search
for and identify best evidence, and appraise that evidence for rigor and applicability to the clinical problem. Best evidence consists of pre-appraised individual studies and overviews. Basic principles of scientific inquiry, quantitative and qualitative research methods, and research ethics are introduced in the context of clinically relevant research. (Fall and Spring)

311. Statistics for Health Sciences. This course is an introduction to the basic techniques of statistical analysis with particular application to the health science research. Topics include levels of data measurement, descriptive statistics and data display, probability, significance, power, and parameter estimation; and hypothesis testing as inferential techniques. With the use of statistical software, the student develops the ability to choose and conduct appropriate statistical tests for the analysis of simple data sets and ability to interpret the results of those analyses. Statistical techniques introduced are correlation, regression, Chi-square, t-test, analysis of variance, logistic regression, and confidence limit estimation. (Fall)

351. and 352. Portfolio Seminar I and II. Credit—1 hour each. The purpose of the portfolio seminars is to use a self-reflective process to document college-level learning that students have achieved through past personal and professional experiences. Adult and self-directed learning theories are used to help students demonstrate prior learning and to document this learning in measurable ways that may translate into elective credits within a program of study. Students are assisted in creating individualized plans with supporting documentation that facilitates completion of R.N. to B.S. program requirements and positions them for future professional development. Upon completion of the Portfolio Seminars, there is the option of 1–6 additional elective credits awarded upon completion of variable credit petitions documenting learning outcomes. (Fall, Spring, and Summer)

353. Health Policies and Decision Making in Health Care Systems. This course provides an overview of decision-making processes used by professional nurses at the individual client and population levels. Strategies to affect health care policy decisions which shape health care systems are considered. Contemporary social and ethical issues as well as appropriate professional nursing roles are examined using concepts and principles of ethical decision making, human diversity, global health care, and epidemiology. The impact of information and health care technologies on nursing care are discussed. (Fall)

354. Concepts of Leadership and Management. This course provides an introduction to the fundamental principles of leadership and management pertinent to health care. Concepts and tools necessary for succeeding in a nursing leadership role in complex organizations are analyzed and applied. Students acquire a familiarity with performance improvement processes through discussion and class assignments. A field experience is required. (Spring)

355. Contexts of Health Care. This course examines the changing context of health care systems and the settings in which services are provided. Forces affecting the delivery and utilization of health care services are examined. This course exposes students to a variety of health care systems and explores the environment in which nursing and health care is provided. Selected issues related to health service provision are examined including managed care, nursing case management, and collaborative community partnerships. A field experience is required. (Fall)

362. Comprehensive Health Assessment of the Individual. Credit—3 hours. This course builds on the biopsychosocial sciences and focuses on techniques of history-taking and physical examination in a cross-cultural context. Using a systems approach, focused and comprehensive assessments of essentially well clients throughout the lifespan are addressed. Students describe findings and differentiate normal from atypical or abnormal. Diagnostic reasoning skills are developed through analysis of the assessment data. A laboratory/clinical experience provides opportunities for students to integrate communication, assessment, and problem-solving skills with fundamental nursing care procedures. Prerequisite: Anatomy and Physiology. (Spring and Summer)

370. Pathophysiology/Pharmacology. Credit—6 hours. This course focuses on the physiologic changes that occur as a result of disease processes, the clinical manifestations indicative of altered health and the drug therapy used to treat or effect these disease processes. The course integrates anatomy, chemistry, microbiology, physiology, and pharmacology, and focuses on their application to clinical practice. (Summer)

371. Management of Care. This course prepares nurses to assume leadership roles by designing, managing, coordinating, and evaluating care in health care delivery systems. Content focuses on the role of the nurse leader in the care of populations and groups; planning and effecting change, quality improvement, securing and managing financial and human resources, developing effective teams and work groups, and utilizing informatics and other technology. Issues related to health service provision are examined including health care systems, population health programs, nursing case management, legal issues relative to nursing management, and selected professional concerns. This course includes clinical experience in clinical nursing leadership, case management, and other service delivery units. Pre- or co-requisite: NUR 301; co-requisite: NUR 374 and NUR 375, or NUR 377. (Spring)

372. Therapeutic Interventions I. Therapeutic Interventions I is a clinical nursing course. This course focuses on acquisition of fundamental nursing skills. It is designed to also provide the student the opportunity to incorporate concepts and skills learned in Health Assessment in Health and Illness. It provides the student with a foundation for delivering therapeutic nursing care and interventions to individuals, families, and groups from diverse populations. In this course, the student applies this learning in various practice settings to care for diverse consumers including individuals and families desiring health promotion as well as those experiencing alterations in health. Pre- or co-requisites: Professional Rescuer Cardiopulmonary Resuscitation Certification and NUR 362. (Summer)

373. Nursing Science. Credit—2 hours. This course introduces the student to multiple aspects of nursing including a historical and theoretical perspective of nursing, professional standards, utilization of the nursing process, critical thinking, and therapeutic communication skills in nursing practice. In addition, it provides a beginning foundation for evidence-based practice, epidemiologic concepts, leadership development, and a framework of interdisciplinary teamwork in health care settings. (Summer)

374. Women's Health, Neonatal and Pediatric Nursing. Credit—7 hours. The student learns to use the nursing process to provide and evaluate care for individuals and families in the childbirth and childrearing stages of life. The student also learns about nursing role development as a collaborative interdisciplinary team member. This course provides nurses with a basic understanding of childbearing and pediatric nursing principles in a variety of clinical settings. Students are introduced to current research, theory, and biological foundations of childbirth and childrearing. The course content incorporates the American Nurses Association Standards of Practice, current treatment modalities, and legal implications of caring for pregnant women and children. Throughout the course, the role of the obstetrical and pediatric nurse is examined as the nursing process is applied to the care of patients bearing and raising children. Clinical experiences are coordinated in a variety of settings and offer students the opportunity to engage with clients and to interact with interdisciplinary teams in providing care. Pre-requisites: NUR 370, 362, 372, and 373. Pre- or co-requisite: NUR 303. (Fall and Spring)

375. Psychiatric Mental Health. The course provides students with a basic understanding of psychiatric and mental health nursing principles in a variety of clinical settings. Students are introduced to current research, theory, and biological foundations of mental disease and mental illness. The course content incorporates the American Nurses Association Standards for Practice, current treatment modalities, and legal implications of caring for mentally ill clients. Throughout the course, the role of the psychiatric nurse is examined as the nursing process is applied to the care of patients with psychiatric-mental health needs. Clinical experiences are coordinated in a variety of settings and offer students the opportunity to engage with clients and to interact with interdisciplinary teams in providing care.
376. Therapeutic Interventions II. 
Credits—1 hour. This course focuses on the acquisition of selected complex nursing skills. Also provides students a laboratory foundation for delivering therapeutic nursing care and interventions to individuals that is applied to patients in concurrent or subsequent clinical specialty courses. Prerequisite: NUR 372. (Fall)

377. Adult and Home Nursing. Credits—7 hours. The student learns to use the nursing process to provide and evaluate culturally sensitive care for individuals and families experiencing adult health problems across diverse settings including home. The student also learns about nursing role development as a collaborative interdisciplinary team member. Students apply principles of evidence-based care in planning, providing, and evaluating patient care outcomes. Clinical experiences are coordinated in a variety of settings and offer students the opportunity to engage with clients and interdisciplinary health care members to provide care across the health continuum. Pre- or co-requisites: NUR 374, 375, 376, and 301. (Fall and Spring)

378. Genetics. Credits—2 hours. This course provides nurses with basic information about the influences of genetics on human health and illness, practice in applying important tools for effective genetic nursing practice with consumers from various cultures and ethnic heritage, an arena for consideration of ethical and social implications of genetic knowledge, and experience in the use of printed matter and computers to support evidence-based health care and lifelong learning in applied human genetics. (Summer)

379. Nursing Integration. Credit—1 hour. This course provides a comprehensive review of nursing content areas and the application of the nursing process across specialties and settings. Selected nursing management concepts are examined. (Spring)

The following graduate course is open to undergraduates with permission of the instructor.

403. Ethics and Public Policy. This foundational course provides an overview of the structure, regulation, and financing of the health care system in the United States. Nursing’s past and present contributions and its potential to shape future health care are evaluated. Contemporary health care and policy issues are examined using concepts and principles of planned change, ethical decision making, the policy process, and policy analysis. (Spring)
Mark Zupan, Ph.D. (M.I.T.)  Dean

Although undergraduate degrees in business are not offered, the William E. Simon Graduate School of Business Administration cooperates with other University divisions in offering the 3-2 program, through which a student can earn in five years, instead of the usual six, a bachelor’s degree in his or her undergraduate concentration and a Master of Business Administration degree.

EARLY LEADERS AWARD AND SCHOLARSHIP PROGRAMS
In the fall of 2005, the Simon School introduced its Early Leaders™ award and scholarship programs that offer special scholarships to applicants with zero to three years’ work experience. Candidates are nominated by those from an extensive network of Simon School alumni as well as 700 key influencers including professors, career services experts, academic advisors, and athletic directors. These individuals identify college juniors and seniors who seem to be likely candidates, using such criteria as strong written and oral communication skills; exceptional academic performance; leadership ability; a positive, “can-do” attitude; and the willingness to work hard. Nominees are eligible to have the $125 application fee waived and receive a Simon Early Leaders marble award. Those admitted to the Simon School become eligible for a $5,000 scholarship, at a minimum, and potentially, a full-tuition award. For more information on the Simon Early Leaders award and scholarship programs, visit www.simon.rochester.edu/simonearlyleaders.

THE 3-2 PROGRAM
LEADING TO A B.A. AND AN M.B.A.
The Simon School cooperates with the College at the University of Rochester in offering a combined undergraduate and graduate degree program. The 3-2 M.B.A. Program allows students to earn both a bachelor’s degree in an undergraduate major and a Master of Business Administration degree in five years, rather than the traditional six.

Students in the 3-2 program study for three years in their undergraduate major and complete major and distributive course requirements. Between January and March of their junior year, qualified students apply for admission to the Simon School. After acceptance, they take the first year of the M.B.A. program, rather than the traditional “elective” senior-year courses.

At the end of that year, 3-2 students should receive a bachelor’s degree in their undergraduate major. They then complete the Simon School M.B.A. in one additional year.

3-2 PROGRAM FACTS
• A bachelor’s degree and an M.B.A. degree are earned in five years.
• The program maintains all of the full-time M.B.A. program requirements.
• Admission to the 3-2 program is limited and is offered only to exceptionally well-qualified students.
• Students may enter in September.
• Some undergraduate preparation in economics, mathematics, or statistics is desirable but not required.
• Application to the 3-2 program is made during the junior year of the undergraduate degree program.

3-2 PROGRAM ADMISSION REQUIREMENTS
The 3-2 program requirements are the same as for the full-time M.B.A. program.

Applicants must
• have achieved outstanding scholarship in their first two and a half years of undergraduate study;
• have completed a business internship prior to commencing the M.B.A. program;
• have obtained their undergraduate department’s permission to enter the 3-2 program;
• have scored well on the Graduate Management Admission Test (which they should take by January of their junior year);
• have interviewed with a member of the Simon School’s Admissions Office staff.

3-2 PROGRAM CURRICULUM
Students in the 3-2 program must meet the requirements of, and take the same core courses listed for, the full-time M.B.A. program. Students are also required to pass the management communication sequence, and the same options are available for concentrations and electives. The M.B.A. curriculum consists of nine required core courses, 11 required electives, and a management communication course sequence.

THE CORE
The core curriculum is taken during the first three quarters. Students who enter the M.B.A. program in September take the core curriculum in the fall, winter, and spring quarters. Students who enter the M.B.A. program in January take the core curriculum in the winter, spring, and summer quarters. During the first three quarters, students complete the nine required courses, one or more electives, and the management communication sequence over two quarters.

The core curriculum provides a comprehensive general business education and serves as the foundation for advanced study in selected areas of concentration. The core curriculum is comprised of the following nine courses: ACC 401, Corporate Financial Accounting; STR 401, Managerial Economics; CIS 401, Information Systems for Management; FIN 402, Capital Budgeting and Corporate Objectives; GBA 411, Framing and Analyzing Business Problems 1; GBA 412, Framing and Analyzing Business Problems 2; OMG 402, Operations Management; MKT 402, Marketing Management; and STR 403, The Economic Theory of Organizations. A three-course management communication sequence is also required.

Concentrations and Electives
Elective courses in each of the 14 areas of concentration are devoted to applying, implementing, and integrating the principles learned in earlier courses.
Although students are not required to complete a concentration, most opt for at least one, and in many cases, two. Concentrations permit students to develop expertise in the following areas:

- Accounting and Information Systems
- Business Environment and Public Policy
- Competitive and Organizational Strategy
- Computers and Information Systems
- Corporate Accounting
- Electronic Commerce
- Entrepreneurship
- Finance
- Health Sciences Management
- International Management
- Marketing
- Operations Management
  —Manufacturing
  —Services
- Public Accounting

Up to two courses from other schools and colleges of the University may also be taken, with M.B.A. Program Committee approval, when related closely to the student’s area(s) of concentration.

APPLICATION INFORMATION
Rebekah Lewin
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P.O. Box 270107
Rochester, New York 14627-0107
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CONCENTRATIONS
Accounting and Information Systems
In response to the automation of major accounting functions in organizations, the Simon School has designed an integrated concentration in computers and information systems and accounting which provides thorough training in both areas.

Business Environment and Public Policy
This concentration provides students with the skills to understand the economic environment in which a firm operates for business success.

Competitive and Organizational Strategy
This concentration focuses on business decision making in the competitive marketplace. The program is designed specifically to help students gain general management skills that can then be applied broadly within multidimensional business structures or consulting.

Computers and Information Systems
The computers and information systems concentration prepares graduates for management responsibilities in using computer systems and will enable them to provide organizations with successful management information systems.

Corporate Accounting
The corporate accounting concentration is actively recruited by corporations for positions in controllers’, treasurers’, and internal auditing offices, as well as in accounting departments.

Electronic Commerce
Managing in the rapidly evolving environment of Electronic Commerce requires an understanding of the technology infrastructure needed for e-commerce and the new business models that leverage on the special capabilities of the Internet. Students learn state-of-the-art tools for supporting the marketing, logistical, financial, and service-delivery aspects of doing business online. The concentration prepares students to create, manage, direct, and analyze e-commerce initiatives. Courses in this concentration combine ideas, cases, projects, and guest lectures by Internet entrepreneurs.

Entrepreneurship
The Simon School is committed to the teaching of entrepreneurship. The entrepreneurship concentration allows students to draw from a variety of carefully selected courses to become business generalists who are well versed in organizing and managing resources.

Finance
This concentration provides students with state-of-the-art techniques for financial analysis. Students learn to formulate and solve important corporate finance problems and learn to obtain information from the many databases on financial markets.

Health Sciences Management
The health sciences management concentration draws on the Simon School’s proven strengths and directs them to a dynamic industry. The Simon School’s concentration focuses primarily on two management issues: ongoing operations and strategic planning. This is in contrast to traditional Master of Public Health degree programs, which generally focus on public policy issues. The program especially suits future health sciences consultants and front-line managers in health maintenance organizations, hospitals, insurance companies, and pharmaceutical firms.

International Management
The international management concentration gives students opportunities to apply various disciplines to international markets. Differences in legal environments, currencies, and workplace practices among countries provide both challenges and problems for businesses operating in the global marketplace.

There are two options for satisfying the concentration. The first involves one required course and three electives. The second involves one required course, one elective, and one term (minimum of six credits) in an approved international exchange program.

Marketing
The marketing concentration continues to be a strong area of opportunity for graduates with an M.B.A. The concentration gives students excellent preparation for marketing research, marketing consulting, and product management.

Operations Management—Manufacturing Operations Management—Services
Operations management is concerned with the managerial decisions by which a firm allocates and uses its physical, financial, and human resources to produce goods or services. The resurgence of interest in operational productivity has reinforced the demand for M.B.A.s with the ability to analyze resource management problems in manufacturing and service firms.

Public Accounting
The public accounting concentration offers courses necessary for sitting for the Uniform Certified Public Accounting (C.P.A.) examination in New York State and other states.

RESEARCH ACTIVITY
Research activity at the Simon School includes independent research conducted by faculty and graduate students and other studies carried out at the School’s research centers.

The Bradley Policy Research Center was established in 1966 to investigate the impact of government policy on business firms.


THE BUSINESS AND GOVERNMENT INFORMATION LIBRARY
The Business and Government Information Library, located on the second floor of Rush Rhees Library, offers many resources in management, economics, marketing, statistics, accounting, operations research, and computer information systems. The library provides reference services in the library and through the library’s Web site via chat service and a bulletin board.

The library’s Web site provides access to business and economic journals, magazines, and newspapers from around the world. Company, industry, and marketing statistical data, including corporate financial data, are available. Research support tools such as bibliographic citation managers are provided.
The Business and Government Information Library has an unusually extensive collection of corporate reports including annual reports, 10Ks, and proxy statements from 1978 to the present.

The circulating collection of business and economics books and bound periodicals of about 60,000 is located in stack areas on the third floor of Rush Rhees Library.

THE SIMON SCHOOL DEPARTMENT OF INFORMATION TECHNOLOGIES

The Simon School Department of Information Technologies (IT) provides support services to all students, faculty, and staff. The Simon IT department offers services ranging from workstation and printing support through network and e-mail services. The IT team is staffed by experienced support specialists. The IT department and the Computing Center are located on the fourth floor of Schlegel Hall. The Computing Center is designed to support student needs with extended hours, technical support, and 30+ student-accessible workstations (Internet ready). The workstations are connected to centralized laser printers.

Although the Computing Center provides ample computing capability, students are required to own a laptop computer. Technology plays a significant role in modern business practices. It is this focus on the integration of technology into the Simon education that prepares students to enter and/or continue in the business world with technical confidence. For example, much of the M.B.A. curriculum relies on spreadsheet, word processing, and statistical applications. Also, the eventual creation and maintenance of professional quality resumes and other important documentation rely heavily on students’ mastery of the productivity software that the Simon School provides.

Students may contact the Simon IT department for recommendations on hardware and software that will support the requirements of the current curriculum.

CAREER MANAGEMENT CENTER

The Career Management Center seeks to support the goals of its two primary constituencies—students and recruiters. The staff of the center possesses the expertise to provide innovative, customized services.

The Career Management Center’s counseling and education staff offers targeted, personalized one-on-one counseling to assist students through the stages of executing an effective career search strategy. From self-assessment and career exploration to plan development and implementation, a dedicated and knowledgeable counselor provides support and encouragement to Simon students.

The Corporate Relations arm of Career Management actively markets the Simon product to promote awareness and secure full-time and summer internship career opportunities with leading Fortune 500 companies, mid-to-small-sized firms, and entrepreneurial startups. Corporate Relations partners with alumni business professionals, faculty, staff, and students, taking an integrated lead development approach to maximize overall marketing efforts.

Together, the partnership of counseling and corporate relations activities provides a strong foundation for career success for Simon students.

COURSES OF INSTRUCTION

UNDERGRADUATES

Definitive course listings are published before each semester. Courses listed here carry 4 credit hours unless otherwise noted. Following are some of the recent or planned offerings.

The following courses are offered in both day and evening sessions and are available to full- and part-time undergraduate students.

ACCOUNTING

201. Principles of Accounting. An introduction to the principles and procedures employed in analyzing business transactions, recording their financial effects, summarizing them in financial statements, and interpreting these statements. Not open to first-year students.

221. Cost Accounting. Study of the accounting problems involved in determining, analyzing, and controlling production and distribution costs, and income determination for financial statements. Budgetary control, standard costs, and other topics are discussed from the viewpoint of management use in planning and control. Prerequisite: ACC 201.

BEHAVIORAL SCIENCES IN INDUSTRY

241. Fundamentals of Personnel Administration. A survey of all aspects of human resources. Topics include strategic planning, staffing, training and development, compensation, benefits, health and safety, employee and union relations, and laws governing how organizations must treat people. Open to juniors and seniors only.

COMPUTERS AND INFORMATION SYSTEMS

215. Foundations of Management Information Systems. A survey of information system technology and its application to the various functional areas of business. Topics include a complete overview of computer hardware and software, introduction to systems analysis, database management systems, data communications, system development and acquisition, management of computing, and analysis of the strategic considerations of information systems for business. Prerequisite: one of EE 171, OPT 105, CSC 108, CSC 171, CSC 181, or any 200-level CSC course.

225. Data Management. An in-depth study of data management, data processing, and database techniques. Topics include input and output processing; data structures; sequential, direct, and indexed access methods; report generation; and theory and practice of database management systems. A high-level data processing language (COBOL) is used by students for file processing. The design, operation, and management of database systems are practiced using a relational database product (SQL/DS). Prerequisite: CIS 215.

FINANCE

205. Financial Management. This course provides a market-oriented framework for analyzing the major types of financial decisions made by corporations. Discounted cash-flow techniques are introduced and applied to the capital budgeting problem (the choice among alternative investment projects) and financial asset valuation. Security markets are discussed and topics of capital market efficiency and portfolio theory are introduced. The effects of capital structure and dividend policy on the value of the firm are analyzed. Prerequisites: ACC 201, ECO 207 or equivalent.

206. Investments. This course covers various aspects of investments. Debt, equity, and derivative instruments are discussed, along with the markets in which these securities trade. In addition, investments in these and other financial instruments via mutual funds are examined, as are the market implications of combining financial investments into portfolios. The concept of efficient capital markets is covered, along with anomalies that arise regarding the efficient markets hypothesis. Debt securities and the management of debt portfolios are explored, as is equity valuation. In addition, financial derivatives such as options futures and swaps are studied in detail.

GENERAL BUSINESS ADMINISTRATION

257. Fundamentals of Business Administration. An introduction to the principal activities, responsibilities, types of policy problems, and interrelationships of the main phases of business, including personnel, production, marketing, and finance. Frequent use is made of business cases for illustrative purposes and to introduce students to the method of business problem analysis. Not open to first-year students.

291. Reading Course. Independent study in some specific area of business administration, at a level advanced beyond that of regular course offerings. Prerequisite: written approval of the supervising faculty member.
LAW

205. Business Law. A study of basic principles in several fields of law of significance to businesses and other organizations, including constitutional law, contracts, and business torts. This is preceded by a review of certain environmental and historical aspects of the law, including the legal processes by which our laws are created, and the functions of the courts. Throughout, the emphasis is on developing an understanding of the reasoning process used by the courts to resolve disputes and define new law. Open to juniors and seniors only.

MARKETING

203. Marketing. Problems involved in the movement of goods from producers to consumers and industrial users through the different channels of distribution. Analysis of the marketing functions performed by manufacturers, wholesalers, retailers, agent middlemen, and market exchanges. Critical analysis of major marketing policies. Evaluation of such topics as pricing, branding, choice of distribution channels, selective selling, and the planning and administration of sales programs. Not open to first-year students.

213. Marketing Projects and Cases. This course concentrates on the practical application of sound marketing principles. The specific business situations involve students in analyzing the available information and in developing appropriate marketing plans. Recommendations regarding prices, communications, and distribution channels are evaluated against the context of customer needs and competitive positions. Practical guidelines for analyzing problems and for creating plans are developed involving cases, guest speakers, readings, lectures, and projects.

OPERATIONS MANAGEMENT

231. Operations Management. The course discusses problems encountered in managing the production of goods and services, and models and techniques for dealing with these problems. Emphasis is on developing analytic insight into selected models which have proved useful. Topics include strategy and tactics, decision theory, forecasting, production management, material planning, project planning, and quality control. Video presentations and case discussions are also included to gain practical insights into the operations function. Not open to first-year students.
**THE WARNER MISSION**

At the Margaret Warner Graduate School of Education and Human Development, we believe that education can transform lives and make the world more just and humane. This vision informs our teaching, research, and service as a research school of education, as we strive to:

- **PREPARE** practitioners and researchers who are knowledgeable, reflective, skilled, and caring educators, who can make a difference in individual lives as well as their fields, and who are leaders and agents of change.

- **GENERATE** and disseminate knowledge leading to new understandings of education and human development, on which more effective educational policies and practices can be grounded.

- **COLLABORATE**—across disciplines, professions, and constituencies—to promote change that can significantly improve education and support positive human development.

Our diverse work in each of these domains is informed by the following underlying beliefs:

- the improvement of education is in pursuit of social justice.
- development and learning shape and are shaped by the contexts in which they occur.
- the complexity of educational problems requires an interdisciplinary and collaborative approach.
- and best practices are grounded in research and theory; just as useful theory and research are informed by practice.

**PROGRAMS**

The Warner School offers the following master’s and doctoral degree programs that may be of interest to undergraduates considering graduate work in education and human development. Students are encouraged to take courses in these programs as undergraduates, both to explore the interesting intellectual and career opportunities available in education and to possibly gain a “jump start” on graduate work. Many undergraduates apply to Warner programs in teaching and curriculum, counseling, human development, higher education, and educational policy in their senior year.

**Educational Leadership**

Educational Leadership offers programs in higher education, school leadership, and educational policy. The Master of Science (M.S.) degree in Educational Administration is offered with a concentration in K–12 education, higher education, and higher education student affairs. At the doctoral level, the Doctor of Education (Ed.D.) in Educational Administration is offered with a concentration in K–12 education or higher education, and the Doctor of Philosophy (Ph.D.) in Education is offered with a concentration in educational policy and theory or higher education.

**PERSPECTIVES ON EDUCATION FOR UNDERGRADUATES**

While the University does not offer a bachelor’s program in education, undergraduates interested in education and human development—and the many issues related to schools, socialization, learning, and growth—are encouraged to pursue study at the Warner School. Issues such as the application of sociocultural theory and research to human learning and development, the ties among economic, social, and educational practices and policies, the relations among race, gender, language, ethnicity, class, disability, and schooling, the historical and philosophical foundations of teaching and learning, the uses of technology as teaching and learning tools; and other matters of significance to contemporary society may be studied at the Warner School. Warner courses may complement undergraduate programs in the College and/or offer undergraduates the opportunity to explore new intellectual areas and career opportunities in the educating professions. It may even be possible to begin studies for specific careers at the Warner School as an undergraduate. Students are encouraged to talk about these possibilities with any member of the School’s faculty or a counselor in the Admissions Office, (585) 275-3950.
Preparing for Teaching Careers
Due to changes in the New York State teacher certification requirements, the Warner School no longer has a teacher education program at the bachelor’s level. Undergraduates interested in a career in teaching are encouraged to take courses at Warner and seek classroom experience to help get a jump start on a graduate program in their area of interest. Starting teacher education coursework as an undergraduate provides students with the opportunity to explore and better understand the teaching profession and can allow for the completion of a master’s degree and New York State certification in one additional year of study. Teacher certification is offered through one additional year of postgraduate study, and is offered at the early childhood and elementary level and in English, mathematics, Latin, French, Spanish, German, the various sciences, and social studies at the secondary level. Students considering a career in teaching are also encouraged to complete subject area requirements at the undergraduate level. New York State specifies the number of hours in various subjects required for certification (usually about 30 undergraduate credits in the subject of specialization), including two college-level semesters of one foreign language (ASL is also acceptable). Consult with a counselor in the Warner School Admissions Office, (585) 275-3950, for exact requirements for the specialization you are considering.

Fifth Year in Teaching Program
The Fifth Year in Teaching Scholarship provides a limited number of awards for full tuition for graduate study to University of Rochester undergraduates who apply for admission to the Warner School during their senior year to become teachers in urban settings. Successful applicants are accepted into the Urban Teaching and Leadership Program (UTL), where they will complete a Master of Science (M.S.) or Master of Arts in Teaching (M.A.T.) degree and two years of teaching in an urban school. The UTL program combines the theory, practice, and activism to help candidates develop the knowledge, skills, and dispositions required to become effective advocates for urban students and their families. The goal of the UTL program is to prepare urban educators who have the courage and conviction to lead struggles for social justice, in-depth knowledge of the subjects they teach, and the skills and understanding needed to help all students develop to their fullest potential.

The Fifth Year in Teaching Scholarship has been designed to help the Warner School address the needs of urban schools by encouraging qualified University of Rochester undergraduates to become skilled teachers in urban areas. Recipients of the award will include individuals who are able to increase the diversity of the urban teacher population or increase the number of certified teachers in specializations where there are the highest shortages in the Rochester area. Upon acceptance of the Fifth Year in Teaching Scholarship, candidates make a commitment to successfully obtain their master’s degree from the Warner School, become certified to teach by the NYS Department of Education, and to teach in an urban school for two complete academic years. Please see www.rochester.edu/Warner/admissions/fifthyear.html for eligibility criteria and details.

The Combined Undergraduate and Graduate Programs in Counseling and Human Development
The combined undergraduate and graduate programs offer an opportunity for qualified students to begin graduate study toward the Master of Science (M.S.) degree during their senior year. The master’s program in human development can be completed after one year of postgraduate study. The school counseling program that leads to New York State certification as a school counselor takes about two years of postgraduate study. The programs in mental health counseling that lead to New York State licensure in mental health counseling also can be completed in about two years.

In the first year of the combined programs, students finish their undergraduate program and receive the bachelor’s degree in their undergraduate concentration at the end of the senior year while they are simultaneously enrolled in the master’s degree program. In the human development program they must complete a minimum of 15 credit hours of graduate coursework, and these 15 hours can be counted as part of credit-hour requirements for both degrees. For the counseling programs, students must complete their undergraduate hours in their entirety, and the graduate coursework only goes toward the graduate degree, not the undergraduate degree. A master’s thesis and, in the case of the counseling programs, internships are required. Applications for the combined programs are accepted in the junior year in the February 1 and April 1 cycles, although applicants are encouraged to apply early.

Higher Education
The Warner School’s programs in higher education prepare thoughtful administrators and researchers for positions at post-secondary institutions, in government, and in many organizations that work with and for colleges and universities. A new specialization in higher education, student affairs offers students an opportunity to combine practical leadership experience in student affairs with a dynamic academic program. Undergraduates are encouraged to take courses in higher education to complement their student leadership experience, explore the field of higher education administration, and possibly get a jump-start on a master’s program in the field.

The Guaranteed Rochester Accelerated Degree in Education
The Guaranteed Rochester Accelerated Degree in Education (GRADE) is a five-year B.A./B.S. + M.S. education program for students admitted to the University of Rochester who are interested in becoming educators (six years if pursuing a specialization in counseling). GRADE students enter the University with an assurance of admission to the Warner School with the Steven Harrison quarter tuition scholarship for the duration of the program. The program is designed to offer students a quality liberal arts education while also preparing them to become educators.

COURSES OF INSTRUCTION
Definitive course listings and complete descriptions are published before each semester and are available on the Warner Web site at www.rochester.edu/warner. Courses listed here carry 3 graduate credit hours unless otherwise noted.

The following courses are among those available to undergraduates. Students interested in pursuing a future degree from the Warner School and who hope to take courses that will count toward these programs are encouraged to consult with a counselor in the Office of Admissions at (585) 275-3950 to ensure appropriateness for the program of interest. Please note that the successful completion of coursework does not guarantee admission to Warner programs, and final decisions about transfer credits can only be made at the time the student’s “program of study” is approved.

With the approval of students’ undergraduate academic advisors and the Warner School registrar, students are welcome to take additional introductory graduate courses (400 level).

EDU 403. Public School Choice. An in-depth exploration of the details surrounding school choice policies in the United States, including magnet and charter schools, as well as intra- and inter-district choice plans.

ED 410. History of American Education. Defines education broadly as the formal or conscious transmission of culture in family life, colleges, peer groups, youth agencies, religious and cultural organizations, and the media. Investigates the processes of cultural transmission across four centuries of American history, beginning in the mid-1600s, but the major emphasis is on post-1900 themes.

ED 411. Philosophy of Education. Examines a range of contemporary controversies and historically influential philosophical theories of education as a vehicle for critical reflection on the political, moral, epistemic, and linguistic aspects of educational practice.

ED 412. Sociology of Education. Integrates sociological theory, policy studies, and contextual applications in respect to education, schools, communities, and professional practices.
ED 415. Adolescent Development and Youth Culture. (Ages 10 to 20.) Develops an understanding of what it means to be an adolescent in present day American culture; explores adolescent development as an integral part of lifespan development, employing cultural, psychological, social, and biological perspectives.

ED 418. The Family and Social Dynamics. Introduces the basic dimensions and dynamics of the family as a social institution and as a significant context for individual lives.

ED 419. Life Course Studies. Examines the popular myths and misunderstandings about aging and the life course by critically surveying existing scholarly knowledge, research, and theory about the life course and examining how the individual’s biographical experience and view of his or her personal past and future are shaped both by societal institutions and by interpersonal expectation.

ED 425. Minority Youth Development in Urban Contexts. Explores the psychological, educational, and sociocultural factors that impact minority children and adolescents.

ED 428. Ethics in Education. Explores the moral dimensions of education and educational leadership in K–12 and higher education settings, developing skills in ethical analysis through examining case scenarios and model analyses on topics such as grading, academic honesty, academic freedom and censorship, educational research and experimentation, classroom management and discipline, and sexual harassment.

ED 429. Theories of Human Development. Provides a comprehensive introduction to multidisciplinary approaches to human development within the behavioral and social sciences. Explores theories of human development and the process of individual change over time that occurs in social, cultural, and historical contexts.

EDU 442. Race, Class, Gender, and Disability in American Education. Prepares students to better understand diversity issues, with the ultimate goal of discontinuing existing practices of exclusion and inequality in schools and society. Surveys and critically analyzes literature on diversity and encourages candidates to examine their own positions of identity, including race and ethnicity, class, gender and sexual orientation, language, religious belief, age, and ability and the consequences of these identity positions on teaching and learning in diverse settings.

EDU 446. Entrepreneurial Skills for Educators. Engages students in the development of skills and practices that make traditional entrepreneurs successful and examines how these practices can empower educators to be more effective leaders and agents of change.

EDU 455. Policy and Practice in Developmental Differences. Creates opportunities, support, and resources for individuals concerned with developmental differences and normalcy. Oriented by a developmental, lifelong, and multidisciplinary approach, participants work to dispute dominant disability discourses of “lacks and absences” and to reconsider developmental differences as neither inherent nor “less than” what is needed.

EDU 464. Child Development and Learning in Context. (Ages 5 to 12.) Examines the development of children from theoretical and empirical perspectives, emphasizing the role of a wide range of contextual factors in children’s development. Examines research trends and findings in the areas of language development, social development, intellectual development, learning, and achievement motivation.

EDU 467. Language, Literacy, and Cognitive Development. Develops an understanding of how children develop oral communication, reading, writing, and other literacy skills, and how this development can be supported and enhanced.

ED 483. Communication and Counseling Skills for Teachers, Administrators, and Other Helping Professionals. Introduces the educating or allied helping professional to the basic skills and core perspectives of counseling as a form of communications.

ED 485. College Students and Student Development Theory. Explores psychosocial, cognitive-structural, identity, and typology theories of college student development.

EDU 492. Governance, Policy, and Administration of Higher Education. Examines the organization and governance of American higher education institutions, giving due weight to the context in which trustees, presidents, academic administrators, and faculty members make decisions.

EDU 493. History of Higher Education. Provides a historical survey of and examines critical issues in the evolution of American higher education, beginning in the colonial era and extending to the present.

EDU 494. Human Development in Old Age. Examines aging as dynamic complexes of sociocultural, political processes between persons over histories, localized by gender, ethnicity, social status, life experiences, sexual orientations, and health/wellness.

EDU 498. Literacy Learning as Social Practice. Assists students in the construction of a comprehensive theoretical framework for understanding and examining the nature of literacy learning in and out of schools. Students develop a conception of literacy as a social practice and build an understanding of the social context of literacy learning as the negotiation of the multiple linguistic and cultural realities of contemporary society.
ACADEMIC SUPPORT SERVICES
In addition to consulting their faculty advisors, all undergraduate students in the College are strongly encouraged to use the services of the College Center for Academic Support throughout their college careers. The professional advisors in this office assist students in arranging their programs, suggesting courses, obtaining faculty advisors, and making the unavoidable paperwork as simple as possible. Questions concerning the Rochester Curriculum, certificate programs, the “Take Five” Scholars Program, interdepartmental studies, and many other concentrations will be answered.

The University Tutoring Program Office and Orientation Program Office are located in the Center in Lattimore Hall. Immediately adjacent to the Center in 312 Lattimore the Academic Services Counter serves as a focal point for satisfying quickly many routine academic inquiries, for dropping and adding courses, for making immediate appointments or walk-in arrangements to see an academic advisor, and for providing fast referrals to other offices.

The School of Engineering and Applied Sciences offers additional academic advising through a faculty advising system and the School’s Dean’s Office in 306 Lattimore Hall. The Margaret Warner Graduate School of Education and Human Development offers advising and information assistance related to programs in education through its Student Services, 2-161 Dewey Hall, and through faculty of the school.

For School of Nursing student support services, please contact the school’s Student Affairs Office, (585) 275-2375.

PROGRAM PLANNING
One of the University’s goals is to help undergraduates plan an integrated program of study which will provide intellectual satisfaction and challenge. Program planning with the help of faculty advisors begins during Orientation and continues throughout a student’s academic career at Rochester. Discussions with faculty and professional staff advisors are useful in working out a schedule of courses for a particular semester as well as an overall plan for future semesters. Many special services designed to assist undergraduate students are described below.

FRESHMAN ADVISORS
Students interested in degree programs in arts and sciences work extensively with a freshman advisor well into the sophomore year. They consult with their advisors when they register for courses and consider dropping or adding any courses. After being admitted to a major towards the end of the sophomore year (or after completion of 16 courses in the case of part-time students), students are assigned faculty advisors in the area of their majors.

Students interested in degree programs in the School of Engineering and Applied Sciences have faculty advisors from the desired majors assigned to them at the beginning of the first year and are encouraged to consult with them frequently. These faculty will remain as the students’ advisors until graduation, unless a student changes majors or is re-classified to another graduating class.

Students in the School of Nursing are assigned a faculty advisor upon matriculation for the entire length of their programs.

PROGRAM PLANNING WORKSHOPS
During Orientation, just prior to the start of classes in the fall, faculty members representing all academic areas in the College are on hand to assist new students in choosing and registering for courses. In November and in April, during the registration period, students already enrolled who have financial clearance from the bursar select their courses with the help of their advisors and register online for the following semester. Each semester, just prior to registration, the College Center for Academic Support coordinates advising-related events where students may obtain help in planning programs, clusters, majors, minors, and sorting out the ways in which academic goals may be fulfilled.

For School of Nursing program planning, please contact the school’s Student Affairs Office, (585) 275-2375.

REGISTRATION
Entering students register for their courses online before and during Orientation, scheduled during the week prior to the start of classes. Returning students who have received financial clearance from the bursar may register online during regular registration periods. A person is not considered a student until registered.

Students in the School of Nursing register online. The School’s registrar is located in 1-126 Helen Wood Hall.

Students who have not received financial clearance before the registration periods will forfeit their priority for course selection and lose the opportunity to participate in the room drawing procedure. Nursing students who do not register during early registration are charged a late fee.

In cases where students settle their accounts after the registration period, the bursar’s office will notify the registrar’s office that the student is cleared for registration. Cleared students may then register and apply for on-campus housing. Should accounts remain unsettled at the end of the term, the bursar’s office will refer such cases to the dean of the student’s college for withdrawal for financial reasons.

UNIVERSITY TUTORING PROGRAM
The University Tutoring Program is administered through the College Center for Academic Support. This service offers, through a carefully selected group of tutors, supplementary tutorial assistance to students based on their individual needs. The tutor’s role is to help provide the student with a better understanding of the subject and to help discover and remedy the cause of the difficulty.

Students interested in tutorial assistance should apply at the College Center for Academic Support. Financial help to those students needing it may be arranged upon recommendation of the Financial Aid Office.

For School of Nursing tutoring services, students should contact the school’s Student Affairs Office at (585) 275-2375.
Only tutors approved by the University Tutoring Program are paid for their services. Students wanting to become tutors are welcome to apply at that office.

**STUDY SKILLS COUNSELING**

Counselors in Learning Assistance Services, 107 Lattimore Hall, offer help in study skills and math by talking with students individually and helping them to develop strategies for studying more effectively and efficiently. Tutors in the College Writing Center, Rush Rhees Library, Room G-121, help students to examine their written work, correct problems, and make appropriate revisions (see page 174). School of Nursing students requiring assistance should contact the school’s Student Affairs Office (275-2375).

**COURSE DEFINITION**

The ordinary unit of undergraduate instruction is the course. Many courses numbered between 100 and 399 carry the equivalent of four hours of credit. Every four-hour course requires approximately one-fourth of the student’s working time for one term. School of Nursing students’ hours vary by program. Restrictions concerning prerequisites and approval required are noted in each semester’s schedule of courses and must be observed carefully. In some cases, special forms are required and may be obtained in the appropriate advising offices.

**PROGRAM OF COURSES**

A normal schedule for regularly enrolled students in the College is four 4-credit courses per semester. This permits completion of the 32 courses (128 credit hours) required for graduation in eight semesters. Full-time students are expected to take four years for the degree. A few accelerate. Others occasionally find it necessary to make up work during the summer. Taking extra credits is not considered a means of speeding up the timetable for attaining a degree, but rather a means for enriching an academic program. Only students with a “B” average or better in one semester are permitted to take more than 19 credit hours during the next semester. This is referred to as an “overload.” First-semester freshmen are not permitted to take more than 3 credit hours over their four regular courses. For full-time students, fewer than 14 credit hours is termed an “underload,” and enrollment in at least 12 credit hours is required. Both overload and underload programs must be approved by the student’s dean, normally through the College Center for Academic Support. If credits in excess of the standard four-course load are used to accelerate, a retroactive tuition adjustment will be assessed for all credits in excess of the normal 16-hour course load per semester counting towards degree requirements. The assessment is generally made in the student’s final semester. Additional financial aid resources are not available.

**College Course Numbering System**

<table>
<thead>
<tr>
<th>Course Numbering</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>001–099</td>
<td>Noncredit courses—usually at the first- and second-year level, no graduate credit</td>
</tr>
<tr>
<td>100–199</td>
<td>Introductory courses</td>
</tr>
<tr>
<td>200–299</td>
<td>Courses at the third- and fourth-year level that may also carry graduate credit</td>
</tr>
<tr>
<td>300</td>
<td>Study abroad</td>
</tr>
<tr>
<td>301–399</td>
<td>Experimental courses, independent courses, courses toward degree with distinction or honors</td>
</tr>
<tr>
<td>400–489</td>
<td>Graduate courses at the master’s level or the first year of graduate study, open to undergraduates by special permission</td>
</tr>
<tr>
<td>490–499</td>
<td>Master’s-level reading or research courses</td>
</tr>
<tr>
<td>500–589</td>
<td>Advanced or specialized graduate courses—usually at the doctoral level</td>
</tr>
<tr>
<td>590–599</td>
<td>Doctoral-level reading or research courses</td>
</tr>
</tbody>
</table>

**CLASS ATTENDANCE**

Each instructor sets the regulations regarding attendance for each class; many do not make class attendance mandatory. But, consistent absence from class may determine whether or not students pass a course. When it is necessary to be absent because of travel or illness, students are expected to make arrangements with instructors for catching up on class work they miss.

If a student has been seen by a Health Service provider during the course of an illness, the UHS will be able to document the knowledge of the illness that restricts activity. Services provided by the University Counseling Center will not be documented in any way for purposes related to class attendance.

**SPECIAL ACADEMIC OPPORTUNITIES**

Students are encouraged to take courses for which they are qualified wherever the courses are offered at the University of Rochester to fulfill academic goals. Admission to certain courses requires special permission. Usually, this means permission of the instructor, whose signature is then required on the registration form. Special requirements must be met in the following instances:

- **Affiliated Area College Courses.** In the College, students who wish to take a course at one of the area colleges in order to complement their programs of study may obtain information and registration forms from the College Center for Academic Support. Grades received in approved courses are noted on the transcript, but are not used in computing the grade-point average. Transfer credit is granted for courses passed with a grade of “C” or better.

**Audited Courses.** If a student plans to participate in class sessions and work without earning a grade for a course, and without earning credit toward a degree, the course may be included in the class schedule at the time of registration. There is no extra cost for matriculated full-time students, but permission of the instructor is necessary. The audited course will not appear on the transcript.

**Graduate Courses.** Qualified undergraduates may, with the written permission of the instructor and the approval of their dean, register for graduate-level courses.

**Honors Seminars.** Special application is required in some cases. Courses and restrictions are listed in the schedule of courses.

**Independent Study Courses.** Formal arrangements must be made with appropriate faculty members for these special reading or research courses. An Independent Studies Form is submitted to the College Center for Academic Support at the beginning of the semester. Students are eligible to apply for a 4-credit-hour independent study course each semester. Independent study courses required specifically for a major are listed under departmental offerings. Internships provide another kind of independent study.

**Internships.** In the College, these off-campus learning experiences require that arrangements for academic credit be made by the end of the third week of the semester. A maximum of eight hours of credit for Rochester-area internships may count toward the degree. Students who obtain approval from the Internship Committee for work outside the Rochester area may receive as much as a full semester’s credit toward their degree. Admission to some programs is highly selective. Questions should be addressed to the College Center for Academic Support in 312 Lattimore Hall.

The School of Engineering and Applied Sciences cooperates with private industry to provide several internships to selected undergraduates. Interns are paid for their work experience and thus do not receive academic credit. However, written evaluations of the work experience, both by the student and the employer, in some cases, do become part of the intern’s academic record. Students receive information concerning these opportunities as they become available.

*Noncredit course fees. All persons attending noncredit courses must pay fees as announced for these courses. If they are organized outside the normal academic framework, noncredit courses may not be covered by the usual blanket undergraduate full-time tuition.
**Quest Courses.** These courses, meant primarily for students in their first year, are shaped by the practices of faculty learning. They embody a research-based pedagogy, and exemplify research as a way of learning. Quest courses are normally small, exploratory, and research-oriented. They emphasize conversation and collaboration, and feature the perspective of a second look. Quest courses can be library-, data-, or laboratory-intensive, and emphasize the skills that benefit the process of investigation. Freshmen, who have priority, are given the opportunity to register for fall courses during Orientation.

**Study Abroad.** Information about the various programs sponsored by the University of Rochester and about other opportunities for study abroad is available in the Center for Study Abroad and Interdepartmental Programs in Lattimore Hall. (See page 8.)

**Summer School Courses.** Day and evening courses in a variety of fields are offered in several sessions each summer at the University. Grades earned in these courses are calculated into the cumulative grade-point average, and credit toward the degree is awarded for courses in which passing grades are earned. Students also may take advantage of special opportunities to study abroad on one of Rochester’s programs. Credit for summer study at other institutions may require approval from the department offering comparable work at the University of Rochester. Approved summer work at other institutions completed with a grade of “C” or better is recorded in terms of course credit, but the grades are not used in computing the student’s cumulative average. Further information and approval forms are available at the College Center for Academic Support.

**Double Majors**

Students enrolled in the College may choose to pursue two majors leading to the Bachelor of Arts degree. In most instances students may do so by fulfilling concurrently the requirements determined by each of the two departments and by receiving written permission (usually on the declaration forms) from the respective major advisors to pursue a double major in the other area. Questions concerning double majors, including course overlap policies, can be addressed to the College Center for Academic Support and the appropriate major advisors.

**Double Degrees**

Students who plan a program leading to more than one baccalaureate degree, such as the Bachelor of Arts and a Bachelor of Science, are required to meet all requirements for each degree and to receive approval for pursuit of these degrees from the Administrative Committee of the College. Students who wish to complete work in two areas as part of a single degree need only obtain approval for each major and for the double major (see Double Majors above). The requirements for double degrees within the School of Engineering and Applied Sciences are specified on page 137.

Students interested in pursuing a Bachelor of Music degree offered by the Eastman School of Music while also pursuing a Bachelor of Arts or Bachelor of Science degree offered by the College need to be accepted separately through each office of admissions.

**Minors**

Students may choose to minor in one or more of the several dozen areas available to them (see list of minors, page 10). Students are eligible to declare a minor after they have been accepted into a major and before the end of the first semester of their senior year.

**ACADEMIC PROCEDURES**

Full-time students are subject to the following regulations. Part-time students should check with their college of enrollment for any variations in regulations.

**Course Changes**

Students register for their courses online during registration or at Orientation, as described earlier. They may later change their programs and withdraw from a course, add a course, or drop one course and substitute another. These changes are made online or on a drop-add form that may be obtained from the Center for Academic Support within the deadline for the particular action, as described below.

Students in the College may add independent study courses through the third week, and other courses through the fourth week, with the instructor’s written approval. They may drop them and have them deleted from the record through the fourth week. Students may withdraw from courses through the last day of classes, providing the instructor has been informed. For students through the first drop-add period of the sophomore year, the authorization of the freshman or sophomore advisor is needed for every add, drop, or withdrawal action. Courses from which students have withdrawn will appear on their transcripts with the “grade” of “W.” The advising record will show in addition the week of the semester in which the course was withdrawn.

Students in the School of Engineering and Applied Sciences may add and/or drop a course during the first four weeks of each semester. The permission of the faculty advisor and the associate dean are required for add and drop transactions.

Students in the School of Nursing must have a degree plan on file in order to register for nursing coursework. Students who withdraw from a nursing course after the fourth week will receive WP or WE. Students may withdraw from a course until the 12th week of classes by obtaining the course coordinator’s and advisor’s signatures. Clinical courses can only be repeated one time.

For all students, course changes can be made only if the deadlines are met, if the instructors of the affected courses approve, and if the change meets the provisions outlined earlier for overload or underload schedules.

**Student Petitions**

The faculty of the College and the School of Nursing establishes degree requirements within those entities. The faculty recognizes that there are instances in which interpretations are required and exceptions should be made. The Administrative Committees, comprising both faculty and students, review requests for exceptions to faculty regulations.

Students seeking exceptions to regulations submit a written petition to the College Center for Academic Support or their dean’s office for review by the appropriate committee. It is an advantage to discuss the content of the petition with a faculty or academic advisor before submitting the petition. Students will be informed in writing of the committee’s action.

School of Nursing students submit petitions to the school’s Student Affairs Office.

**Satisfactory-Fail Option**

Undergraduate students in the College are encouraged to venture outside areas of their major, investigate new disciplines, and discover new, perhaps unsuspected, interests. The satisfactory-fail option may reduce anxiety about electing a course in an area in which the student has had little or no prior experience.

Students enrolled in the College may elect to take one course per semester up to a maximum of eight courses and receive grades of Satisfactory (S) or Fail (F). The grades “S” and “F” do not affect the cumulative grade-point average.

Instructors assign and submit regular letter grades for students choosing this option, as they are not informed which students have elected the option. The registrar records “S” for letter grades “A” through “D–” or “F” for the letter grade “E” on the student’s permanent record, retaining the letter grades “A” through “E” on file. Students who are interested in conveying maximum information on the transcript to professional and graduate schools should speak to an advisor prior to electing the option.

Students enrolled in the College may declare the option in the College Center for Academic Support through the fourth week of classes and, except for first-semester freshmen and transfer students in their first semester who may change or declare the option through the thirteenth week of the semester, the option may not be changed. The option is not available in summer.

Students pursuing degrees in the College may not elect this option for courses used to fulfill College, major, or minor requirements.

Students planning degrees from engineering and applied sciences should note that courses taken with the satisfactory-fail option may not be used to fulfill department requirements or cluster courses. These courses may be used...
to fulfill additional humanities or social sciences requirements or for free electives for an engineering degree. Otherwise, only courses taken beyond those required for a degree may be taken with the option.

**Incompletes**
A grade of “I” should be given only when there are circumstances beyond the student’s control, such as illness or personal emergency, that prevented the student from finishing the coursework on time. Under no circumstances may the “I” be given for the following situations:

- student who wishes to do additional work after the course deadline to improve a grade
- student who wishes to redo the coursework in a subsequent semester to improve the current grade.

A form requesting a grade of “Incomplete,” indicating the work outstanding and the deadline for its completion, must be signed by both the student and the instructor and submitted to the College Center for Academic Support. There is a one-semester limit for completion of the course, unless the College permits an extension. (Extensions are routinely granted when students are expected to complete their work by attending the course the next time it is offered, if the course is taught only once a year.)

Once a final grade has been submitted, whether passing or failing, the grade of “I” will be removed from the transcript. The grade of “I,” however, will continue to appear on the advising record. The instructor may request a waiver of the recording of the “I” on the advising record when the lateness was created by circumstances unrelated to the student, such as equipment failure in a laboratory.

The student’s failure to submit the form or to complete the work by the deadline will result in an “E” for the course, unless the instructor noted on the form that a different grade should be assigned. The dean of the College shall inform the student of an impending action to change the “I” grade before notifying the registrar.

In the School of Nursing, a student receiving an “Incomplete” must complete the coursework prior to the end of the subsequent semester. A form requesting the “Incomplete” grade may be obtained from the registrar in Helen Wood Hall and must be completed according to the instructions on the form. Failure to file this form will result in a grade of “E” for the course.

**Repeating a Course for a Grade**
There are times when students wish to demonstrate on their official record that they understand the material better than their grades indicate. Students are encouraged to discuss with their advisors the appropriateness of retaking a course for a better grade. When a course is repeated at Rochester for a grade, both course registrations and both grades appear on the transcript, but only the second (not necessarily the better) grade is used to calculate the grade-point average. Credit may be earned for a course only once.

**Senior Year in Absentia**
Students in the College expecting degrees in arts and sciences and who are admitted to a professional or graduate school at the end of their junior year may be eligible to spend their senior year in absentia. All college and major requirements should be completed by the end of the junior year. Those students considering a senior year in absentia should discuss the possibility in the College Center for Academic Support and petition the Administrative Committee for approval. If in absentia status is approved, the student will earn a baccalaureate degree from the University of Rochester following successful completion of the first year in the graduate or professional program. Students who have spent their junior year abroad will not receive approval to spend the senior year in absentia.

Because a student’s most advanced work can be done in the senior year, students expecting degrees in engineering and applied sciences are not encouraged to take that year in absentia. Students interested in attending other colleges as special students or in beginning medical or law school early should consult their faculty advisors.

**Withdrawal and Inactive Status**
Students who contemplate withdrawal from the University should consult an advisor in the College Center for Academic Support or their school’s dean’s office.

Students wishing to spend a semester or more away from the University to work, to travel, or to study at another institution may apply for “inactive” status in the College Center for Academic Support or their school’s dean’s office. Those students who are placed on inactive status pay a nominal fee and receive registration materials. Housing priority is assigned in accordance with their classification.

School of Nursing students completing arts and sciences foundation courses in other schools or by examination must register for inactive status if not concurrently registered for nursing coursework.

Students holding residence halls contracts who withdraw or are withdrawn from the University for any reason should be aware that their residence hall contracts are automatically cancelled upon receipt of a withdrawal notice from the appropriate advising offices. Withdrawn students have no further claim to their assigned space. Students who are officially reinstated and who wish to live in the residence halls must submit a new contract, and they will be placed on a space-available basis. These conditions also apply to students in absentia. Study Abroad or in internship programs, and students going on inactive status who change their plans and request reinstatement for the semester in which they originally had intended to be away.

**Adjustment of Charges, Withdrawal and Inactive Status**
For students who withdraw or declare inactive status during the first 50 percent of the term, or who change from full time to part time, tuition, room, and board, and fees will be adjusted according to the schedule that follows. The period for tuition adjustment will be measured from the beginning of classes to the effective date of the change determined by the appropriate academic dean’s office.

Withdrawal or declaration of inactive status, or change from full time to part time:

**ACADEMIC YEAR 2007/2008**

- **Fall 2007**
  - 09/04-09/09/2007: 100%
  - 09/10-09/16/2007: 90%
  - 09/17-09/30/2007: 50%
  - 10/01-10/28/2007: 25%
- **No Refunds After 10/28/2007**

- **Spring 2006**
  - 01/16-01/20/2008: 100%
  - 01/21-01/27/2008: 90%
  - 01/28-02/10/2008: 50%
  - 02/11-03/09/2008: 25%
- **No Refunds After 03/09/2008**

The 2008/2009 Refund Schedule will be available as of May 1, 2008.

For students withdrawing or declaring inactive status or changing to part-time status for medical reasons, tuition refunds will be calculated after consultation with University Health Service and the appropriate academic dean’s office.

**Adjustment of Financial Aid, Withdrawal and Inactive Status**
Because financial aid is based upon total anticipated costs, adjustments in these costs because of withdrawal or placement on inactive status ordinarily will result in a reduction of previously committed financial assistance. The calculation of the reduction will be made by the Financial Aid Office after verification of the date of withdrawal or placement on inactive status by the dean. Federal regulations require that this calculation be completed within 45 days of notification of the change of status.

Refunds to federal aid are calculated according to a federal formula based on the percentage of the term that has been completed by the student. Repayments to federal financial aid programs will be made in the following order: Federal Direct Unsubsidized Loan, Federal Direct Subsidized Loan, Federal Perkins Loan, Federal Direct PLUS, Federal Pell Grant, Federal ACG, Federal SMART, Federal SEOG. State grant and scholarship refunds are done according to state guidelines. University grant and merit refunds are determined according to the University refund schedule.

Inactive students studying at another institution are not eligible for University-
administered financial aid. Completion of a consortium agreement, however, may allow such students to receive their Federal Direct Loans, Federal Pell Grants, and, if attending another New York school, Tuition Assistance Program grants.

Determination of Student Status
The University retains the right to determine the student’s status within the University. The University has discretionary powers to maintain a student’s enrollment, to grant academic grades, to authorize graduation, or to confer any degrees or grant any certificates. Each student concedes to the University the right to require the student’s withdrawal at any time for any valid reason, including failure to pay the term bill.

THE GRADING SYSTEM, TRANSCRIPTS, AND DEGREES

Grades
The undergraduate grading system for all River Campus colleges is as follows:*  

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Performance Level</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A–</td>
<td>Excellent</td>
<td>4.0</td>
</tr>
<tr>
<td>A–</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>Above Average</td>
<td>3.5</td>
</tr>
<tr>
<td>B–</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>C+</td>
<td>Minimum Satisfactory Grade</td>
<td>2.7</td>
</tr>
<tr>
<td>C–</td>
<td></td>
<td>2.3</td>
</tr>
<tr>
<td>D+</td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td>D</td>
<td>Minimum Passing Grade</td>
<td>1.3</td>
</tr>
<tr>
<td>D–</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>E</td>
<td>Failure</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Grades which carry no grade points:

I  - Incomplete  
W  - Withdraw without effect on the grade-point average  
P  - Pass (mandatory grading system in certain courses)  
S  - Satisfactory (Satisfactory-Fail option)  
F  - Failure (Satisfactory-Fail option)

In the School of Nursing, C– is the minimum passing grade for required and upper-division nursing courses for the R.N. to B.S. program. The Accelerated Program for Non-Nurses, Bachelor’s Curriculum, requires a grade of C as the minimum passing grade for required and upper-division courses. Additionally, in the College, if the instructor in any course regards the written work of the student as deficient by reason of expository style, the grade will be so flagged on the final grade roster. This flag will not become part of the student’s permanent record.

Dean’s List
Following the close of the fall and spring semesters, a list is issued of those students whose academic achievement warrants notation on the Dean’s List.

An overall semester grade-point average of 3.4 and completion of 16 or more credit hours, at least 12 of which have normal letter grades (A through E), with no “F” or “N” grades, are required for a student to be named to the Dean’s List. (Seniors and students classified as Take Five need to complete successfully 12 or more credit hours with normal letter grades and no “F” or “N” grades.)

Part-time students can be named to the Dean’s List by achieving a 3.4 grade-point average in the immediately preceding semester if they have also completed 16 credit hours with a grade-point-average of 3.4 during the preceding 24 months (including summer grades). At least 12 of the 16 hours must be completed with normal letter grades, and the student must have no outstanding “F” or “N” grades.

For the School of Nursing, Dean’s List appointment requirements are listed in the Student Handbook.

Probation and Separation
The College and other schools regularly review the academic progress of registered students and act to place on probation or separate those not meeting these standards:

• An overall (or cumulative) grade-point average for all semesters completed of at least 2.0  
• A grade-point average for the latest semester of at least 2.0  
• Acceptance into a major before achieving junior standing and, once accepted, a grade-point average of at least 2.0 in the courses submitted for the major.

In the School of Nursing, satisfactory progress is achieved by maintaining all of these standards:

• A cumulative grade-point average of at least 2.0 for all semesters completed  
• A semester average (just completed) of at least 2.0 and successful completion of all work  
• A final grade of C– (C for APNN students) or above in the nursing courses. (A complete list of these courses can be found in the School of Nursing Student Handbook.)

Probationary status will be given to any student who has any of the following:

• A cumulative grade-point average below 2.0 but above 1.3  
• A semester average (just completed) below 2.0 but above 1.3  
• A final grade of D+ (C– for APNN) or below in any upper-division nursing course or any required course.

Separation may be activated for any of the following reasons; if a student:

• Has been on probation the preceding semester and does not meet the standards for satisfactory progress as previously listed  
• Receives a final grade of D+ (C– for APNN) or below in an upper-division nursing course  
• Has a cumulative GPA less than 1.3.

For additional information regarding progression issues for nursing students, consult the School of Nursing Student Handbook.

Usually, the College and other schools warn a student of impending difficulty by placing him or her on probation for a semester before considering separation. Students on probation are encouraged to seek advising, tutoring, and counseling assistance. Their advisors are notified of students’ academic difficulties, as are the Department of Athletics and Recreation (for students on intercollegiate teams), the Director of Minority Student Affairs (for underrepresented minority students), the International Services Office (for international students), and the Department of Naval Science (for students affiliated with the NROTC Program). Any student whose enrollment is continued is will be considered in good academic standing.

The student’s dean can be asked to review actions on separation. Any request must be made in writing. Reviews are granted only when pertinent new evidence is presented.

Financial aid for students on probationary status is subject to adjustment. Federal and New York State aid recipients must meet standards of satisfactory academic progress in order to remain eligible for these awards. Additional information about these standards is available from the Financial Aid Office.

Grade Reports
Students may view their grades online through UR ACCESSplus at any time. Information available to students includes courses taken, grades received, credit hours earned, and semester and cumulative grade-point averages.

For University policy regarding reports to parents, see University Records, page 190.

Academic Transcripts
Official academic transcripts, which include a record of the student’s entire undergraduate program, are issued by the registrar’s office to other institutions or prospective employers at the student’s written request. The University reserves the right to withhold academic transcripts in the event of an outstanding balance owed the University.

*The School of Engineering and Applied Sciences does not give the grades of D+ and D–.
A common form of academic dishonesty is plagiarism. This is the use, whether deliberate or unintentional, of an idea or phrase from a source without proper acknowledgment of that source. The risk of plagiarism can be avoided upon which an academic community depends. The College recognizes quality of performance in a major by awarding the degree with "distinction," "high distinction," or "highest distinction." Each department establishes its own criteria for the varying levels of distinction subject to the approval of the College Curriculum Committee and the Steering Committee of the Faculty Council.

Bachelor's Degree with Honors
Certain departments in the College offer programs of study leading to the degree "with honors in research." An honors program requires students to complete a minimum of 12 credit hours in courses designated by the department as "honors courses." These courses must include at least one advanced course or seminar and the course or courses in which the senior thesis or research project is completed. Specific course requirements for each major may be found in the appropriate departmental section in this bulletin.

ACADEMIC HONESTY
As members of an academic community, students and faculty assume certain responsibilities. One of those responsibilities is to engage in honest communication. Academic dishonesty is a serious violation of the trust upon which an academic community depends.

A common form of academic dishonesty is plagiarism. This is the use, whether deliberate or unintentional, of an idea or phrase from a source without proper acknowledgment of that source. The risk of plagiarism can be avoided in written work by clearly indicating, either in footnotes or in the paper itself, the source of any major or unique idea or wording that the student did not arrive at on his or her own. Sources must be given regardless of whether the material is quoted directly or paraphrased. Another form of plagiarism is copying or obtaining information from another student. Submission of written work, such as laboratory reports, computer programs, or papers, which have been copied from the work of other students, with or without their knowledge and consent, also is plagiarism. In brief, any act that represents someone else's work as one's own is an academically dishonest act.

A second example of academic dishonesty relates to the misuse of library materials. Any act that maliciously hinders the use of or access to library materials is academically dishonest and falls under the terms of this policy. The removing of pages from books or journals disadvantages others in the academic community. Similarly, the removal of books from the libraries without formally checking out the items, or the intentional hiding of materials, or the refusal to return reserve readings to the library is dishonest and harmful to the community.

There are other forms of academic dishonesty, for example, obtaining an examination prior to its administration or using unauthorized aid during an examination. It is also academically dishonest to knowingly assist someone else in an act of academic dishonesty.

A student remains responsible for the academic honesty of work submitted in University of Rochester courses, even after the student has received a final course grade. This rule also applies to students who are no longer matriculated at the University of Rochester, including those who have graduated.

Ignorance of these standards will not be considered a valid excuse or defense.

School of Nursing students are expected to adhere to the American Nurses Association (ANA) Code for Nurses in their professional conduct. Nursing students, who hold a professional license, are also expected to adhere to the state rules regarding professional conduct. Further information for nursing students is contained in the School of Nursing Student Handbook.

Orientation Honesty Policy Dissemination
During Orientation in the College, the Dean of Freshmen and students’ freshman advisors will introduce students to the nature of academic honesty in the College. At that time, they will be handed a written version of the policy and a form acknowledging that they have received information about academic honesty. Signed acknowledgment forms will be collected by freshman advisors before registration. Transfer students will receive their briefing on academic honesty from the College Center for Academic Support.

These Orientation procedures are designed to reinforce the importance of academic honesty.

All students (matriculated and non-matriculated) enrolled in the College or in College courses must adhere to the College’s academic honesty policy, even if they do not attend Orientation or sign the acknowledgment form.
OFFICE OF THE COLLEGE DEAN OF STUDENTS
Jody Ashbury (University of Rochester) Dean of Students
Anne-Marie Algier (Buffalo) Associate Dean of Students
Matt Burns (Albany) Associate Dean of Students

The Dean of Students Office provides programs and services that enhance student learning, promote community development, and support the educational goals of the undergraduate and graduate populations. Through collaborative initiatives, the Dean of Students Office is dedicated to promoting a strong quality of life for students in both the academic and nonacademic realms. Areas of responsibility are described below.

Student Conduct: Oversight of the disciplinary system regulations, policies, and procedures rests in the Dean of Students Office. Additional activities include raising awareness of conduct expectations, assisting with alcohol and drug education, mediating differences, and fostering student learning through the judicial process.

Mediation Services: Mediation is a voluntary mutual effort to find a suitable resolution to an existing disagreement or dispute through negotiations that seek to meet the legitimate interests of each party. Any currently enrolled student in the College may take advantage of mediation services. These negotiations are facilitated by trained, neutral mediators.

Emergency Loan Program: The Office of the Dean of Students administers an Emergency Loan Program, which provides assistance to students for unexpected expenses. Undergraduate students may borrow up to $150, and graduate students may borrow up to $300.

For more information about the Dean of Students Office, visit www.rochester.edu/college/dos.

Wilson Commons Student Activities
Wilson Commons Student Activities enhances the college experience and creates a diverse campus community by supporting over 200 student organizations. The office focuses on helping student leaders achieve their goals by encouraging them to explore and develop their interests and passions through experiential learning outside the classroom. The office provides information about all student organizations, provides resources to student organizations and the University of Rochester community, and assists students in forming new organizations. In addition, the office manages the University’s student union, Wilson Commons, and coordinates major traditional events of the College such as Yellowjacket Weekend, Boar’s Head Dinner, Winterfest, and Senior Week.

Student Government: The Students’ Association includes all undergraduates and is governed by a student-elected Senate, president, and vice president. The Senate and its over 75 funded organizations are supported by the student activities fee, which is assessed to all full-time undergraduate students. Six standing committees: the Policy & Review Committee, the Projects & Services Committee, Students’ Association, Appropriations Committee, Club Sports Council, and Steering Committee.

Clubs and Organizations: Students can be involved in and attend events sponsored by a wide range of student organizations including Academic Undergraduate Councils, Club Sports, Community Service, Class Councils, Awareness, Entertainment Programming, Intercollegiate Competition, Performing and Fine Arts, Publications and Media, and Religious. Information regarding all student organizations, their officers, and their activities is stored on Campus Club Connection (www.rochester.edu/living/organizations). At the beginning of each semester, students can attend an Activities Fair that showcases the wide variety of student organizations on campus.

Office of Fraternity and Sorority Affairs (OFSA)
The University of Rochester understands the role fraternities and sororities play in the life of campus with 20 percent of the student body being members of the fraternity and sorority community and has worked to develop a college-centered program. The center of this program is a set of standards called Expectations for Excellence.

Utilizing the Communal Principles and the educational philosophy of the College, the University of Rochester developed the Expectations for Excellence. This vibrant, success-driven model for the fraternity and sorority community focuses on attaining true college-centered chapters and guides the work coordinated by OFSA with the 31 recognized chapters within the three governing councils, the Fraternity Presidents’ Council, the Multicultural Greek Council, and the Panhellenic Association.

For more information about the Office of Fraternity and Sorority Affairs visit www.rochester.edu/college/ofsa.

Rochester Center for Community Leadership (RCCL)
At Rochester we encourage our students to learn what they love and to give where they live. Rochester students have historically been active citizens and leaders in both official and unofficial capacities. The Rochester Center for Community Leadership is responsible for developing, coordinating, and promoting a variety of activities and services to enable and encourage students to be engaged in their on- and off-campus communities.

Community Service Network: A student-led group that coordinates various service programs with partner organizations throughout the City of Rochester. Interested students should stop by their office or check out the CSN Web site at www.csn.rochester.edu.

Wilson Day: An annual orientation activity that engages new students in the life of the Rochester community through a day of service during the first week of college.

Urban Fellows Program: A paid summer internship program for area college students. The program immerses fellows in the life of the City of Rochester through on- and off-campuses programs that engage them in current urban and community issues. Fellows work
four days a week in a variety of community agencies and attend seminars on urban issues one day a week.

National Campaign for Political and Civic Engagement: A consortium of colleges from around the country who collaborate to inspire undergraduate students to enter careers in politics and public service by involving them in community service, voter registration, and public service internships.

Leadership Programs: Throughout the academic year the Center offers a number of unique leadership development opportunities for undergraduate students. The Skills for UR Leaders workshop series and Paychex Leadership Institute provide student leaders at all levels with practical organizational skills and competencies, while the Critical Issues in Leadership program combines leadership training and community service activities for an in-depth look at the issues facing communities around the world. The Center also sponsors a course, Leader to Leader, which examines the history, theory, and practice of leadership with guest appearances by local and national business, education, government, and political figures. Each spring students are recognized for their contributions to the campus and Rochester communities during the Women’s Leadership Awards and Student Life Awards.

Complete information about all of the Center’s programs can be found online at www.rochester.edu/college/rccl.

School of Nursing students should refer to the School of Nursing Student Handbook.

RESIDENTIAL LIFE
The Residential Life Program is designed to enhance students’ academic progress and opportunities for personal growth. As a comprehensive program, Residential Life provides undergraduate housing and programs; Special Interest Housing; ResTV; graduate/family housing; as well as off-campus housing listings and support services. If it has to do with where any student lives, it’s within the Residential Life mission. Visit Residential Life at www.reslife.rochester.edu for more information.

School of Nursing students should refer to the School of Nursing Student Handbook.

DINING SERVICES
University Dining Services satisfies nutritional needs of students by serving outstanding, value-added meals. Unique, chef-inspired, menus, featuring international dishes, seasonal influences, and fresh ingredients add flavor to the dining choices.

ATHLETICS AND RECREATION
The Department of Athletics and Recreation strives to provide vibrant, student-oriented programs that enhance the educational experience and recreational interests of the members of the University community. The department supports the educational mission of the College by providing high-quality instruction and facilities to attract the best students and provide them a meaningful athletic and recreational experience as a part of their overall development.

Twenty-two Intercollegiate varsity programs offer a competitive Division III opportunity for 500 student-athletes. The intramural sports program features traditional competition and group fitness classes for over 3,500 participants. The diverse 35 club sports program accommodates approximately 1,000 students. More than 1,500 students, faculty/staff, and community members use the Goergen Athletic Center on a daily basis.

For additional information, call (585) 275-7643.

CAREER CENTER
This nationally recognized facility is dedicated to providing state-of-the-art career planning, job search coaching, placement services, and academically linked career counseling that will lead students in the College successfully through and beyond their undergraduate years. Services and resources include:

The Hyman J. V. Goldberg Career Library—a comprehensive resource center for general career planning and researching specific internship and postbaccalaureate opportunities. Holdings include one of the nation’s best online and printed collections of career and job-search publications, employer information, graduate school materials, and testing information. Through job-search work stations, students access Web resources and use phone and fax capabilities to communicate with prospective employers and graduate schools and to network with alumni.

Pregraduation Student Employment Services—opportunities for students, regardless of demonstrated financial need, to work during their college years either in on-campus positions or for off-campus Rochester-area employers. From traditional jobs earning money for “living expenses,” to truly preprofessional employment, Student Employment offerings emphasize the financial and experiential benefits of working within varied settings prior to graduation. All on-campus positions are posted and regularly updated on the Student Employment Web site accessed via www.rochester.edu/careercenter/seo.

Internet Resources—increasingly, the Center uses Web-driven resources and instructs students how to maximize their use. Basic information about services and programs, as well as links to additional University and other sites, can be accessed via www.rochester.edu/careercenter. The Center uses a state-of-the-art online database which allows students to register for on-campus recruiting, submit résumés for referral to internship and post-graduation employers, view postings, and link to employer Web sites. Rochester is one of a select number of institutions nationally that uses this tool. Also, the Center’s career counseling services enable students to complete two of the most popular vocational assessment devices, the Strong Interest Inventory and Myers Briggs Type Indicator, online prior to individualized interpretation sessions.

Off-Campus Recruiting—annually, the Center hosts Career and Internship Connection events in New York City, Boston, Chicago, San Francisco, and Washington, D.C. These events blend the best of career fair and pre-screened recruiting offerings, with Rochester students interacting with some of the most selective employers in each city. Each year hundreds of interviews for postbaccalaureate positions and internships are generated through the CIC events. Rochester students annually are selected for the most interviews by employers.

Externships and Reach Funding—focusing on the needs of first- and second-year students, the Externship program offers freshmen and sophomores the opportunity to shadow alumni and others within specific fields of interest. For many, this will be the first of many “alumni networking and career exploration” experiences. Reach Funds are available to make unpaid or underpaid internships financially feasible. Students gain commitment from employers, then apply for stipends that will make summer and academic year internships viable options.

Postgraduate Professional and Graduate School Advising—for students planning to apply to graduate programs of study. Advising and application process assistance is available through individual appointments as well as annual programs and workshops. The Center also refers candidates to a Web-based recommendation file service.

The Center’s philosophy is to emphasize the importance of gaining experience and clarifying goals while still an undergraduate. These experiences include on-campus employment and research activities as well as internships. The Reach for Rochester program has, since 1986, facilitated more than 1,200 internship placements nationwide, netting close to $5 million in earnings for participating students and annual stipends in excess of $90,000.

The purpose of all programs of the Career Center is to help students articulate their abilities in the language of prospective employers as well as postbaccalaureate graduate programs. The Center recognizes that many first post-commencement positions are not directly related to the titles of particular majors, while it emphasizes a powerful confidence that Rochester students can and do succeed within a variety of pursuits. Employers regularly indicate that the most important traits a candidate can possess, especially among liberal arts graduates, may be the abilities to conduct research, analyze data, and present findings in verbal and written formats independently or as a member of a group. Employers express a desire to identify candidates who can create verbal and behavioral bridges from what they have done to what they can do. Creativity, curiosity, analytical skills, and
the ability to articulate are exactly the qualities that University of Rochester students possess and project.

While many Rochester alumni enter the employment market immediately upon graduation, almost three-quarters of recent graduates report that they have enrolled in a graduate program within five years of receiving their bachelor’s degrees. Assistance in applying to professional and graduate school programs is available through the Career Center and is complemented by the specific advising services previously described.

Students in the School of Nursing should contact the Office of Student Affairs at (585) 275-2575 for career resources.

MINORITY STUDENT AFFAIRS

The Office of Minority Student Affairs focuses on enhancing the academic life of minority students. The office actively collaborates with University departments to promote student academic success and retention, and to ensure they successfully negotiate university life. The office’s emphasis on academic success is facilitated by providing such services as student counseling and referrals, promoting educational opportunities, offering workshops and symposia, and broadening the awareness of issues of relevance to minority students in the University community.

The Office of Minority Student Affairs manages two programs for the College:

Early Connection Opportunity (ECO) Program—ECO is a prefreshman summer residential orientation program designed to offer supplemental academic support.

Higher Education Opportunity Program (HEOP)—HEOP serves students of diverse racial, ethnic, and cultural backgrounds. It is a program that provides an opportunity for eligible applicants to attend a private four-year institution of high academic standing. The program is designed to assist those students who, because of their economic and educational background, might not consider attending our University. HEOP staff coordinate a variety of academic support, counseling, and financial aid services to enable participating students to successfully complete a degree in 8 to 10 semesters. To be eligible for HEOP students must be residents of New York State and meet specific academic and economic criteria.

The Office of Minority Student Affairs is located in 310 Morey Hall, (585) 275-0651.

INTERFAITH CHAPEL

Distinguished by the diversity of its members, the College welcomes men and women from various faiths practiced by the world’s peoples. The Interfaith Chapel affirms and celebrates a rich mixture of religious expression and heritages by offering a variety of opportunities for religious worship and meditation, social service and personal counseling, and cultural and social events. Chaplains and advisors are available to work with all members of the University community. The director of the Interfaith Chapel works with students, chaplains, and University departments to facilitate and coordinate the many programs carried on within the chapel. Chapel rooms may be reserved for lectures, discussions, or social events.

While there are regular Catholic, Jewish, Muslim, and Protestant services run by chaplains, the Chaplain’s Office also helps identify advisors from other religious traditions to actively support and work with other groups. Students can call 275-4321, TTY 461-1775 to learn more about those options.

INTERNATIONAL SERVICES OFFICE

The International Services Office (ISO) provides a full range of programs and services for approximately 1,300 international students and 500 scholars from over 90 countries who study and work at the University each year. The ISO administers under specific government regulations the F-1 and J-1 visa programs. The ISO staff issues immigration documents through the Student Exchange Visitor Information System (SEVIS) and provides advising on immigration regulations that affect internationals at the University. The ISO acts as the University’s official liaison with the Department of State, foreign and American consulates, the Department of Homeland Security, and local government agencies. The ISO also works with members of the University community to advocate for and address various needs of international students and scholars.

The ISO also serves as an information resource to assist internationals in adjusting to the United States, the University, and the Rochester community. Other services and programs include a comprehensive Web site (www.iso.rochester.edu); an electronic newsletter; tax, travel, and employment workshops; and individual counseling to assist students in effectively coping with personal and cultural adjustment. In order to promote intercultural understanding, cultural, social, and educational programs are planned each year and cosponsored with campus and community groups, including the Rochester International Council. The ISO also offers a comprehensive international student orientation program prior to the start of classes each fall to welcome new arrivals and orient them to the University.

LEARNING ASSISTANCE SERVICES (LAS)

Academic effectiveness is a major concern of many students. The following services are offered by LAS to help students in the College improve academic performance.

Peer-Led Science and Math Support. Students can participate in weekly math and science workshops and study groups to improve problem-solving skills and become more confident when taking exams. These problem-solving group sessions are available for a wide range of courses.

Study Skills. Individual counseling and group workshops address concerns about preparing for exams, reading effectively, taking notes, managing time, enhancing concentration, and developing academic motivation. In concert with the Office of Minority Student Affairs, LAS also provides a study skills course in both the fall and spring semesters.

Disabilities. Students with special needs can receive help in planning academic modifications and developing strategies for meeting the demands of coursework.

Special Topic Workshops. Each semester, a series of workshops is offered on topics such as preparing for exams, taking lecture notes, managing time, writing papers, and practicing for math exams.

Students seeking more information or wishing to make appointments may do so in person or by phone. The main office of Learning Assistance Services is located in 107 Lattimore Hall, (585) 275-9049. Our Web site can be found at www.rochester.edu/College/las.

Nursing students seeking learning assistance, should contact the school’s Student Affairs Office.

STUDENTS WITH DISABILITIES

The coordinator of the Office of Disability Resources works closely with resource coordinators in each school to review documentation of the existence of a disability and to make recommendations for reasonable classroom accommodations. The coordinator also works with the Office of Residential Life, Student Activities, and campus libraries to make arrangements for support services and needed resources.

Classroom Accommodations, a Guide for Students with Disabilities, which describes the University’s disability accommodation policy and procedures, is distributed to all students who have accepted admission to the University and can be found at www.rochester.edu/ada/sacom.html. Anyone seeking further information about what resources are available should contact the Office of Disability Resources at (585) 275-9125.

TESTING

The Testing Office administers proctored final examinations, national testing programs as noted below, as well as a variety of special exams.

Additional information about testing programs can be obtained in the Testing Office in 312 Lattimore Hall. The major testing programs administered by this office include:

Foreign Service Written Exam (FSWE)

Graduate Record Examination (GRE)—subject only
Law School Admission Test (ISAT)
Medical College Admission Test (MCAT)
Miller Analogies Test (MAT)

Questions about other national testing programs should be directed to the Testing Office. If the tests in question are not given there, students will be referred to the proper locations.

WRITING CENTER SERVICES
The Writing Center is staffed by trained graduate-student consultants and undergraduate fellows who offer critical feedback on writing during any stage of the writing process. Writing consultants and fellows come from disciplines across the sciences, social sciences, and humanities.

• Writing consultants are available by appointment.
• Writing fellows are available for walk-in hours Monday–Wednesday evenings and on Sundays in Susan B. Anthony Halls, Room 166, and on the second floor of the IT Center in Rush Rhees Library.

The Writing Center also provides a comfortable computer lab for writing and celebrates the work of outstanding undergraduate writers during our annual spring Writing Colloquium.

Write-On: Our Community of Online Writers
The Writing Center responds online and within 24 hours to queries from University of Rochester students, faculty, and staff.

For more information about writing support services, please contact the College Writing Program, Rush Rhees Library, Room G-121, (585) 273-3584.

Students in the School of Nursing should contact the Office of Student Affairs at (585) 275-2375 regarding writing assistance services.

HEALTH SERVICES
Primary health care is provided for all full-time University students on a prepaid basis through the Student Health Program. Medical care and health education services are provided by the University Health Service (UHS), and mental health services are provided by the University Counseling Center (UCC). Access to medical and mental health care is provided 24 hours a day, 7 days a week, throughout the calendar year. The University Health Service/Counseling Center is accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).

Health Plan. All full-time students pay a mandatory health fee that entitles them to use the Health Services throughout the academic year and the following summer (September 1 to August 31), as long as they are enrolled on a full-time basis. The mandatory health fee covers visits to UHS primary care providers in the University Health Service (UHS), limited visits to UCC mental health professionals, and health education services. In addition to the mandatory health fee, all full-time students must have health insurance. Health insurance is available through the University Health Service. This plan covers diagnostic laboratory tests and X-rays, surgical procedures, hospitalization, and other specific services not covered by the mandatory health fee. Students already covered by health insurance comparable to the University-sponsored plan may waive the fee for health insurance. All non-immigrant international students and their families who are in the United States with them must comply with INS requirements and University policies governing health insurance. A family insurance plan is available for students who wish to have coverage for themselves and their dependent child(ren).

Each year, all full-time students inform UHS about their health insurance coverage by completing the online Health Insurance Selection Process. Students who do not complete this process will automatically be enrolled in the health insurance offered through the University Health Service. Students are financially responsible for fees not covered by their health insurance. Should a student choose to see a private physician or seek care outside UHS without the appropriate referrals, the student assumes responsibility (including financial responsibility) for the health care received.

UNIVERSITY HEALTH SERVICE (UHS)
The University Health Service (UHS) provides a full range of confidential, high-quality primary health care services for full-time University of Rochester students. The UHS clinical staff includes physicians who are specialists in internal medicine, nurse practitioners, and registered nurses. To provide students with more personal and effective interaction, all students are assigned a primary care provider (PCP) at UHS. Students are encouraged to schedule appointments with their PCP.

UHS provides a full range of primary care services, including the treatment of illnesses and injuries, women’s health care, the management of ongoing medical problems, and care and advice for any health concerns. Health education programs and services are provided through the UHS Health Promotion Office.

Confidentiality. The relationship between health care providers and their patients is confidential. UHS will not share information about the fact or nature of a student’s visit to UHS without the student’s permission. Notification of others, including parents, is considered the student’s responsibility unless the condition is serious and the student is unable to assume responsibility for informing others. Parental notification and consent will be obtained for students under age 18, as required by law.

Locations and Hours. For the convenience of students, UHS has offices in the Medical Center, on the River Campus, and at the Eastman School of Music. The office in the Medical Center is open weekdays through-out the year. The River Campus office, located in Susan B. Anthony Halls, is open seven days a week during the academic year while classes are in session. The Eastman School of Music office, located in the Eastman Student Living Center, is open weekdays during the academic year, while classes are in session.

Scheduling an Appointment. Visits to UHS are by appointment at the UHS offices in the Medical Center and on the River Campus. Students should call the main appointment line at 275-2662 to schedule an appointment.

Students at the Eastman School of Music can walk in without an appointment to see the registered nurse. Visits with a physician or nurse practitioner at the Eastman office are by appointment.

When UHS Is Closed. UHS provides access to medical care 24 hours a day throughout the year. Whenever UHS offices are closed, a UHS physician is on call and available by phone for urgent concerns that cannot wait until UHS reopens. Unless it is a life-threatening emergency or a serious accident, students should call UHS (275-2662) before going elsewhere (i.e., the emergency department of a local hospital) for care. In an emergency, students should call Security at x13 for immediate assistance.

Health History Forms/Immunization Requirements. All entering matriculated full-time and part-time students must submit the Health History Form, which includes immunization information, prior to the start of classes. New York State law requires all students to provide proof of immunity to measles, mumps, and rubella. Students who fail to comply with the requirements will be withdrawn from the University. Students with questions can contact UHS at healthinfo@urmc.rochester.edu or (585) 275-0697.

Health Education. The UHS Health Promotion Office promotes the wellness of the University community by providing educational programs and activities that encourage the development of a healthy lifestyle and the effective use of health care services. The office provides opportunities for students to become involved in promoting health on campus. Students interested in getting involved and/or wanting to schedule a program are asked to call 273-5775.

UHS Web Site. For complete information about UHS services, hours, locations, health insurance, announcements, and more, check the UHS Web site at www.rochester.edu/uhss. Information on a wide variety of health topics and links to reputable sites are available on the UHS Web site.

UNIVERSITY COUNSELING CENTER
The University Counseling Center (UCC) offers time-limited individual and couples therapy and yearlong group therapy to all students through the mandatory student health fee. UCC therapists have experience in assisting students with a variety of concerns such as anxiety, apprehension about major
life decisions, depression, relationship difficulties, family problems, eating concerns, sexual functioning, sexual identity, roommate hassles, and general discomfort about what is happening in a student’s life. UCC offers a variety of therapy groups on topics such as adult children of alcoholics, survivors of sexual abuse, eating disorders, bereavement, and relationship issues.

Confidentiality: All contacts with a UCC therapist are confidential. The fact that a student is using UCC will not be disclosed to any University official or faculty member, or to family, friends, or roommates without permission of the student. Because of the sensitive nature of visits, extreme care is taken to protect the confidentiality of patients’ records. UCC records are separate from UHS medical charts and from Strong Memorial Hospital records.

Locations and Hours: UCC has three offices, one in Dewey Hall on the River Campus, one in the University Towne House at the corner of Mt. Hope and Elmwood Avenues, and one in the Student Living Center at the Eastman School of Music. The offices in Dewey Hall and the Towne House are open year round from 8:30 a.m. to 5 p.m. The Eastman School office is open part time during the academic year, while classes are in session. Appointments for any UCC office can be scheduled by calling 275-3113.

After-Hours Care: A mental health professional is on call and available 24 hours a day throughout the year to deal with urgent situations and can be reached at 275-3113 any time of the day or night.

UCC Web Site. Located at www.rochester.edu/ucc, the UCC Web site provides information about the services provided and links the reader to other online health care sites. In addition, mental health questions can be addressed to the UCC online resource “Dear Dr. Ana-Lyze.” This site is to be used strictly as an educational tool and in no way attempts to replace formal therapy.

AUXILIARY SERVICES

University policy requires that parking, food, bookstore, and housing services—services that are used selectively and substantially as matters of individual preference—be sustained by the fees and other charges paid by those who use them, including provisions for depreciation, replacement of equipment, and maintenance. Those services, therefore, are self-supporting and not supported by the University’s tuition and other educational income.

AUTOMOBILES AND PARKING

Students may bring automobiles to the University, but should be aware that parking spaces for students in residence on the River Campus are limited. Monday through Friday from 7:30 a.m. to 7 p.m. on-campus parking for students, employees, and visitors is by permit. Commuter students are guaranteed access to parking permits. Resident students may find that the only parking space available to them is in a lot some distance from the campus.

Parking for resident students is offered by lottery to those who preregister (no freshman parking). Priority is by class year. It is possible that all space may be in use before all resident students have purchased parking permits. Most resident students make use of the shuttle buses between University properties. Free shuttle buses providing service from the more distant lots to the campus run from 6:30 a.m. to 3:30 a.m. weekdays when school is in session.

Vehicles displaying any paid parking permit may park in central campus lots not restricted by posted signs between 4 p.m. and 7:30 a.m. weekdays, and at any time on weekends and University holidays.

For one-day visits to the campus, parking information is available (and permits for the day may be purchased) at the Visitor Information and Parking (VIP) Booth on Wilson Boulevard near Elmwood Avenue.

Wilson Boulevard is a city park road at the edge of the River Campus. Parking on Wilson Boulevard is limited to short-term meters and is not intended for student use.

BICYCLES, MOPEDS, MOTORCYCLES, AND SCOOTERS

In all but the snowiest of seasons, bikes are a convenient and popular means of getting between University buildings and to nearby shopping areas. Parking permits are required for motorcycles. The annual fee for motorcycles in 2007–2008 is $15.00. Parking permits are not required for bicycles. Their use is subject to University regulations. Generally speaking, these vehicles are not permitted in University buildings and may not be locked to trees, lamp standards, railings, or the like.

More information on parking guidelines may be found on the University’s Web page at www.rochester.edu/parking/.

INTERCAMPUS AND PUBLIC BUS SERVICES

First Transit provides free scheduled shuttle bus service to members of the University community with a University ID. Between River Campus, Medical Center, South Campus, all University apartment buildings, and off-campus parking lots. Free service is provided also between River Campus, Memorial Art Gallery, the Eastman School of Music Living Center, and stops at selected points along the route.

Regional Transit Service (RTS) will continue to provide regular, full-fare, scheduled service between downtown Rochester and University facilities.

BANKING SERVICES

Branches of JPMorgan Chase Bank are located on the River Campus in Todd Union and at the Medical Center. Each provides full service banking. Check cashing is provided for students who have JPMorgan Chase accounts. Such service also may be provided, up to a $100 maximum, at nominal charge for others with a University identification card. Additionally, ATMs are located throughout the campuses.

ATMs are located throughout River Campus. The ATMs are as follows: JPMorgan Chase Bank in Todd Union and Rush Rhees Library Road, HSBC Bank in Wilson Commons, and Advantage Federal Credit Union at tunnel entrance to Rush Rhees Library and Susan B. Anthony Halls.

CAMPUS POST OFFICE

The Campus Post Office is a privately run station of the United States Postal Service that is staffed by University personnel. The USPS contracts the University to sell postage and money orders, and handle special service mail such as Express, Certified, Registered, and Insured. Another postal service office is located in the University Medical Center.

In order to receive mail and packages on campus, students must have their own post office box. Private carrier companies (UPS, FedEx, RPS, Airborne, etc.) can be shipped directly to the students’ CPU box; packages of any size cannot be sent to individual residence hall rooms. Incoming freshmen will automatically be assigned a CPU box number at orientation. Mail is delivered to students Monday through Friday; except on University holidays.

When students receive a package or piece of special service mail, they are notified by e-mail. The USPS does not deliver mail to the University on Saturdays or Federal holidays, except for Express Overnight deliveries. By taking advantage of the intramural mail system, students can send mail to any University location, postage free.

For a nominal fee, students can send or receive faxes at the Campus Post Office, as well as sending packages via UPS or Federal Express. A variety of packaging supplies are also available for purchase.

The box fee for an undergraduate student is $40 for the period July 1 through June 30.

STUDENT IDENTIFICATION CARDS

The University provides identification cards for all students. They are required for checking out books from the library, cashing checks on campus, and may be required for admission to various campus events, certain facilities, and activities. The card displays the student’s name, an identifying color bar for campus affiliation, and picture. Students at the Medical Center are required to wear identification badges. The student identification card serves this purpose; worn as a lapel badge or

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displayed from a lanyard. ID cards include a magnetic stripe and a bar code, which serve as keys for authorized admission to residence halls, laboratories, and other areas secured by access card readers. The ID card is required by students to make purchases from their Dining Plan contracts, vending machines, and campus convenience stores. In addition, the student ID card is the principal means for identification on campus and it is useful for positive identification elsewhere.

Entering first-year students are photographed during Freshman Orientation and keep their cards through their senior years. Transfer students are photographed early in the fall and spring terms. The respective colleges arrange special ID card photo sessions for entering graduate student orientation programs. No charge is made for the initial identification card, but there is a fee for replacement of a lost card. Worn or damaged ID cards may be turned in for a free replacement. Upon turning 21, a student may go to an ID Card Officer for a free replacement card, to include an updated photo and a change in the age designation field to “21 or Over.”

UNIVERSITY INTERCESSORS OFFICE
Intercessors provide a resource for solving problems that have not been addressed elsewhere in the University. Students, staff, or faculty members who have concerns about their University experience that cannot be worked out through obvious channels are encouraged to contact the intercessors office for assistance. This office is particularly interested in identifying patterns of problems that indicate a need to change organizational structures or procedures. Helping individuals is an important way to learn what needs to be done to improve the total environment. Intercessors are able to address concerns regarding sexual harassment, racial harassment, and discrimination on the basis of gender, disability, and age. The intercessors office can be reached by phone at 275-9125, 275-5931, and 275-4354 (Medical Center).

SECURITY SERVICES
Campus Crime Statistics
By October 1 of each year, University Security Services provides to all students and staff an annual report with current campus security policies, procedures, programs, and statistics. In addition, free copies are provided to prospective students and staff on request. Crime statistics are reported to the United States Department of Education (US DoEd). The statistics are available on their Web site at http://ope.ed.gov/security/ and on the University’s site at www.security.rochester.edu/. You can also obtain a hard copy of the report, titled Think Safe, by contacting University Security Services at (585) 275-3340. University Security services are available 24 hours/day, 7 days/week by calling x5-3333 from any campus phone or by dialing x13 for emergencies. In addition, Cingular (AT&T) and Verizon customers may make a free call to our emergency Communications Center by pressing #413 from their cell phone. We are in immediate contact with local police, fire departments, and emergency medical resources.

UNIVERSITY INFORMATION TECHNOLOGY
Computers, networks, telephones, and information technology are a vital part of the University experience. The staff of the University Information Technology division provides IT services and support. Students at the University of Rochester have access to:
• a high-speed data network accessible from residence halls and across campus.
• University-authenticated wireless at many academic and public locations around campus. The ITS Web site contains an up-to-date coverage map.
• a large IT Center with an IT Help Desk to answer questions about various technologies and applications.
• several computer labs equipped with modern technology to help with assignments.
• two onsite computer stores that offer educational discounts on computers, hardware, software, computer accessories, popular consumer electronics, and other related information technologies.
• broadcast-quality music and movies through convenient online media services
• competitive long-distance rates and discounted cellular service.

Students living in residence halls are also provided with on-campus digital telephone service, free local calling, voice messaging service, and 24-hour on-campus directory service. For other information about enhanced voicemail, analog adaptors, ADA-compliant services, or TTD equipment, please contact the IT Center at www.rochester.edu/its itshelp@rochester.edu or (585) 275-2000.
Admissions

UNDERGRADUATE ADMISSION
The University of Rochester welcomes self-directed students who demand the freedom to study what they love. These students appreciate the opportunities available through a major research university, yet want the personalization of a smaller school. Undergraduates are admitted as freshmen or as transfer students for full-time or part-time study. Application forms, appointments for campus visits, and other information may be obtained by writing to the Office of Admissions, University of Rochester, P.O. Box 207375, Rochester, NY 14627-0251, by calling (585) 275-2256 or (888) 822-2256, or via the Web at www.rochester.edu.

For admission to the School of Nursing, please call (585) 275-2757 or visit www.son.rochester.edu.

Individual attention is given to each student from the time he or she first becomes interested in the University. A staff of counselors and many faculty members participate in the advising of applicants and review of applications. Admission decisions are based on a student’s high school work, recommendations from instructors and counselors, participation and leadership in school and community life, verbal and analytical skills, outstanding achievements and talents, unique contributions to the residential college environment, and for transfer students, college coursework already completed. Prospective students should interview with an admissions counselor or an alumni volunteer 6–15 months before enrolling.

RECOMMENDED PREPARATION FOR ADMISSION
The University does not expect a specific minimum for high school or college grades or test scores. Students who can grow and learn through Rochester’s academic programs and opportunities do not fit one particular mold, and grades and test scores are not the only indicators of potential success. Therefore, students are evaluated in terms of their individual accomplishments. Rochester requires a secondary school report with recommendation(s) and a transcript showing commitment and achievement. Most applicants complete at least 36 semester units in academic coursework, chiefly English, mathematics, social sciences, laboratory sciences, and foreign languages. Honors, Advanced Placement, or International Baccalaureate courses are expected of students in secondary schools offering these programs. Current licensure as a registered nurse or a prior baccalaureate degree in a non-nursing field is an admission requirement for all School of Nursing programs.

VISITS TO THE UNIVERSITY
The College’s Office of Admissions welcomes families for information sessions, interviews, and campus tours on most weekdays throughout the year, including many holidays. Some weekend options are offered during the spring, summer, and fall.

Prospective students and their families who visit the campus find that informal conversations with counselors, current students, and faculty prove invaluable. Sometimes the Office of Admissions can arrange overnight accommodations on campus for prospective students. Requests to visit campus or to stay overnight should be made at least two weeks in advance.

Students with questions concerning academic departments, student life, or extracurricular activities may write to the Office of Admissions or inquire via e-mail at admit@admissions.rochester.edu.

Applicants who cannot travel to Rochester may wish to speak with an alumni representative in their area (where available) or review the admissions video. Please contact the Office of Admissions for information about interviews and other events in your area, or to request a copy of the video.

For information on visiting the School of Nursing, please contact the school’s Student Affairs Office.

TRAVEL INFORMATION
Rochester is served by many major airlines. The campus can be reached by taxicab from Rochester International Airport (ROC) in approximately 10 minutes. The Greyhound and Trailways bus terminal is within walking distance of East Main Street, where Regional Transit Service Bus No. 19 or a taxi may be taken to the River Campus. Transportation to Rochester is also provided by Amtrak trains. The River Campus is located on Wilson Boulevard at Elmwood Avenue.

APPLYING TO ROCHESTER
Students may apply to enter Rochester for either the fall or spring semester. Applications should be submitted by October 1 for spring consideration and January 20 for fall. Prospective freshmen wanting an early decision for the following fall should see the instructions below.

The following materials are required before the application review can begin: an official copy of a high school transcript, recommendations from a counselor and a teacher, an official SAT or ACT score report, and completed application forms, including a personal essay.

Rochester uses the Common Application. Students may obtain copies of the Common Application from their secondary schools or online at www.commonapp.org.

Applicants are invited to submit additional instructor recommendations and other materials which may be useful in the application review.

Prospective nursing students should request nursing application forms from the Office of Student Affairs, School of Nursing, Box SON, 601 Elmwood Avenue, Rochester, NY 14642.

Admission requirements and application forms for the School of Nursing differ from those of the College.
College Entrance Examinations

Applicants for admission are required to take either the Scholastic Assessment Test (SAT Reasoning) of the College Entrance Examination Board (CEEB) or the American College Test (ACT) of the American College Testing Program. Both are offered several times a year at centers throughout the world. Scores from SAT Subject Tests and junior-year Advanced Placement (AP) and International Baccalaureate (IB) exams are recommended but not required.

Applicants for full admission should take the SAT or the ACT by January of the final year in secondary school. Applicants whose native language is not English are required to submit scores from the Test of English as a Foreign Language (TOEFL) or the English Language Proficiency Test (ELPT). If applying for Early Decision; academic merit scholarships; guaranteed graduate admissions programs in medicine, business, or education; or spring admission, applicants should take the SAT or the ACT by October. The University of Rochester code is 2928 for the SAT and TOEFL, and 2980 for the ACT.

Early Decision

Students who decide that Rochester is their first-choice college may apply for an Early Decision on their applications. If admitted, Early Decision candidates agree to withdraw all other applications and enroll at Rochester.

If the application is completed by November 1, candidates are notified of the admission decision by December 15. Please note that Early Decision candidates should take the SAT I or ACT by October.

If Rochester is a student’s first-choice college, it is to the student’s advantage to apply for Early Decision. Those applicants not admitted Early Decision may be reviewed again as a regular decision applicant.

Notification of Admission Decision

An applicant for spring term admission will usually be notified soon after the application is complete. Applicants for the fall semester will be notified by April 1. For fall regular decision admission, Rochester subscribes to the uniform Candidates’ Reply Date, whereby admitted students are not required to notify the University of their decision until May 1.

By that date, students who accept the offer of admission submit a nonrefundable enrollment deposit of $500 or more. The deposit is deducted from the first tuition bill after the start of classes.

Admission decision times for the School of Nursing vary by program.

Merit Awards

Merit-based scholarships range in amount from $2,000 per year to full tuition. They are invested, without regard for a student’s family’s financial circumstances, in students who demonstrate outstanding academic achievement and potential. Applicants to the University of Rochester are considered for merit scholarships when they apply for admission to the College (Arts and Sciences, School of Engineering and Applied Sciences). Some scholarships require applicants to submit additional documents. All applicants desiring merit-based awards should schedule an admission interview.

The following is a list of all the merit awards offered at the University of Rochester: 7th Generation, Ahora, Bausch & Lomb, Dean’s, FIRST, Geneseo, Frederick Douglass and Susan B. Anthony, Hillsides-Rochester, IB, Kodak, Lorenzo de Zavala, Meliora Alumni, National Merit, National Hispanic, National Achievement, Navy ROTC, PRISM, Renaissance (full tuition), Rochester Endowed, Rochester International, Rochester Ventures, Rush Rhees, STEP, Steven Harrison, Urban League, Wilder Trustee, Xerox, and the Youth Orchestra Scholarship.

For more detailed information about merit awards at Rochester, please visit www.enrollment.rochester.edu/admissions/financial/merit.shtm.

ENGINEERING AND APPLIED SCIENCES

Prospective students interested in exploring any of the degree programs in engineering should indicate this interest on their applications. Because of the structured programs that are typical in engineering, it is essential for prospective majors to consult with faculty in choosing courses and sequences. These students are assigned faculty advisors from the School of Engineering and Applied Sciences at the beginning of their first year.

APPLYING FOR ADMISSION TO A DEGREE PROGRAM IN MUSIC

There are two kinds of bachelor’s degree programs in music at the University and, hence, two different application procedures. The College offers, in cooperation with the Eastman School of Music, the Bachelor of Arts (B.A.) degree with a major in music (see page 101). This liberal arts program, based on the River Campus, includes a combination of academic study, private instruction, and ensemble experience. Although the major is a demanding one (students usually take between one-third and one-half of their courses in music), many music majors also explore beyond the introductory level in one or more nonmusic disciplines, sometimes as a double major.

In addition to completing the application, potential B.A. music majors are encouraged to audition (in person or by tape) to supplement the application for admission and to be placed in private instruction at the Eastman School. Students should request application forms and address inquiries for the B.A. degree program to the Office of Admissions, University of Rochester, P.O. Box 270251, Rochester, NY 14627-0251. Auditions for prospective B.A. music concentrators are arranged through the Music Program of the College, 207 Todd Union, (585) 275-2828.

The University’s Eastman School of Music offers the Bachelor of Music (B.M.) degree in applied music, jazz studies and contemporary media, music composition, music theory, music education, and musical arts. Students in these degree programs pursue intensive studies in music performance and academic music subjects comprising approximately three-fourths of the program, the remainder devoted to English and other related humanities or science subjects of choice. Admission is by audition and is highly selective. The Eastman School is located in downtown Rochester and Eastman students are housed in the Student Living Center across the street from the School. Information on how to apply for a Bachelor of Music degree at the Eastman School of Music is available on the Web site www.esm.rochester.edu/apply. The application deadline for the Eastman School of Music is December 1.

Undergraduate Dual Degree Study

A dual degree program, offering study in the B.A. or B.S. degree from the College (Arts, Sciences, and Engineering) in addition to the B.M. degree from the Eastman School of Music, is available to qualified applicants. The fact that Eastman is a professional school within the University of Rochester makes such combined degree programs possible. Interested students must complete two separate application processes. Admission to the College and Eastman may be based on different criteria and require different application deadlines. Financial aid at the two schools is based on different criteria and policies. This autonomy of admission processes gives each school the latitude to enroll its ideal students.

Once applicants are successfully admitted to Eastman and to the College, they are considered dual degree students of the University. Advisors on each campus are assigned to these students to coordinate the two degree programs. While completing two degrees at the same time can be extremely challenging, about 10–15 students each year choose to pursue this option. For more information, see www.esm.rochester.edu/degrees/bd_grad.php

SCHOOL OF NURSING—ADMISSION

All students admitted to the School of Nursing must hold current licensure as a registered nurse or a prior baccalaureate degree in a non-nursing field. The curriculum is responsive to adult learners, and this is the focus of the baccalaureate program. Courses are often held in the evening once a week or online. The School of Nursing has 3+1 agreements with area community colleges for students who need a basic program to become licensed as a registered nurse; the baccalaureate coursework is then completed at the University of Rochester.

Accelerated Programs for Non-Nurses: the one-year Accelerated Baccalaureate Program for Non-Nurses (ABPNN) and three-year Accelerated Master’s Program for Non-Nurses (AMPNN) require a prior B.A. or B.S. in a non-nursing field, transcripts, a 3.0 GPA preferred,
two letters of reference, a professional statement, and an interview. Anatomy and physiology, microbiology, developmental psychology, nutrition, and statistics (minimum grade of C for all) are prerequisites to the program. At the completion of the one-year generalist curriculum, the Bachelor of Science degree is awarded and students are eligible for professional registered licensing examinations. The Accelerated Master’s Program provides education for generalist and specialist (advanced practice) nursing roles and awards the B.S. and M.S. degrees. Students are eligible for professional registered licensing examinations and nurse practitioner licensure. Students are accepted to a nurse practitioner specialty upon admission to the AMPNN program.

For the R.N. to B.S. program (baccalaureate completion program for registered nurses from an associate’s or diploma program), a 3.0 GPA is preferred. Nursing license/registration is required. Transcripts, two letters of reference, and a professional statement/short essay are also required.

The R.N. to B.S. to M.S. program is an accelerated program for select registered nurses with defined career goals who desire a master’s degree. Applicants have the same admission requirements as master’s applicants, with the exception of a B.S. in nursing: R.N. licensure/registration, two favorable references, a professional statement, and a statistics course (grade C or above). Applicants must declare a specialty area. An interview may be required. GRE or MAT is optional.

The B.S. degree is 128 credits. All arts and sciences courses may be transferred in, or challenge examinations are possible. Upon matriculation, 32 nursing credits are awarded automatically for completion of an accredited diploma or associate degree nursing program. A minimum of 32 credits (49 credits for accelerated programs for non-nurses) must be completed through the University of Rochester School of Nursing.

Applicants should contact the Office of Student Affairs at (585) 275-2375 or visit the Web site at www.son.rochester.edu for program deadlines and further information. Part-time study is available.

ROCHESTER EARLY MEDICAL SCHOLARS PROGRAM ("REMS")

REMS is an eight-year B.A./B.S.-M.D. program for exceptionally talented undergraduates. Students enrolled in this program enter the University of Rochester with an assurance of admission to the University’s School of Medicine and Dentistry when they successfully complete their undergraduate degree programs, including GPA and premedical requirements. REMS enrollees work closely with faculty mentors, and participate in special seminars and events. Successful REMS candidates possess a demonstrated interest in medicine and have a superior secondary school record, standardized test scores, and recommendations. In addition, REMS applicants must complete the regular undergraduate admission application (or the Common Application and its supplement) and the special REMS Supplementary Application by December 1. Information about the REMS program may be obtained by writing to the REMS Program Coordinator in the Office of Admissions.

GUARANTEED ROCHESTER ACCELERATED DEGREE EDUCATION ("GRADE")

GRADE is a five-year B.A./B.S. + M.S. education program for students admitted to the University of Rochester who are interested in becoming educators (six years if pursuing a specialization in counseling). GRADE students enter the University with an assurance of admission to the Margaret Warner Graduate School of Education and Human Development with the Steven Harrison quarter-tuition scholarship for the duration of the program. During their junior or senior year, GRADE students identify their area of specialization and are admitted to the master’s program of their choice provided that they meet all the needed prerequisites. The program is designed to offer students a quality liberal arts education while also preparing them to become educators.

INTERNATIONAL STUDENTS

The University of Rochester values the diversity of a multicultural campus and encourages international students to apply. Because of this commitment, the University is able to offer merit-based scholarships that do not exceed US $12,000 annually to highly qualified applicants. International applicants are required to submit the same application materials and take the same entrance tests as U.S. citizens, but will also need to provide proof of financial support. Because SAT and ACT exams are administered less frequently abroad, and scores take longer to be reported, students are advised to contact the American College Testing Program or the College Entrance Examination Board as soon as they decide to apply to the University. The SAT or ACT should be taken no later than December for fall admission consideration. Because it is often challenging to interpret and evaluate secondary school transcripts from abroad, translations and explanations of grading systems should be submitted. The Ordinary and Advanced level examinations administered in many countries are strongly recommended when available; the results will be considered both for admission and for placement. All correspondence and applications should be sent by air mail or by fax (585) 461-4595.

Application forms for the SAT may be obtained from secondary schools or the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey 08540. Application forms for the ACT can be obtained through secondary schools or by writing to the American College Testing Program, P.O. Box 108, Iowa City, Iowa 52240.

Applicants whose native language is not English are strongly urged to submit scores from the Test of English as a Foreign Language (TOEFL). Students are expected to have a firm command of the English language before they apply; no provisional admission is offered whereby a student may come to the University and spend a semester or a year learning English.

For questions about undergraduate international admission to Rochester, please contact the Office of Admissions at adminfo@rochester.edu

All R.N. applicants intending to earn their baccalaureate degree from the School of Nursing should contact the Commission on Graduates of Foreign Nursing Schools (CGFNS) for information on obtaining a U.S. registered nurse license (www.cgfns.org).

COLLEGE CREDIT FOR PRIOR COURSEWORK

The University prefers that its entering freshmen take all their courses from Rochester faculty. With the exception of Advanced Placement and International Baccalaureate work, the University normally does not grant college credit for secondary school coursework nor for courses taught in a secondary school by its own faculty for college credit.

Credit may be granted for prior coursework completed with grades of C or better at an accredited college or university. Upon receipt of an official transcript and course descriptions from the college where the student was enrolled, the coursework will be evaluated to determine if it is equivalent to coursework offered through the College at the University of Rochester. Students wishing to receive credit for such college work, or who are now considering taking college courses elsewhere, should ask the College Center for Academic Support, (585) 275-2354, for advice about credit transfer and/or selection of courses.

For students in the School of Nursing, course transfer questions should be directed to the Office of Student Affairs, (585) 275-2375.

ADVANCED PLACEMENT AND INTERNATIONAL BACCALAUREATE CREDIT

Entering students may receive course credit and/or higher-level course placement at Rochester through the CEEB Advanced Placement Program. Advanced Placement score reports must be forwarded to the College from the CEEB. Rochester also awards credit for satisfactory scores on the International Baccalaureate (IB) higher level examinations. As soon as these reports are received and reviewed, enrolled students are notified about placement or course credit. This information is used in course selection during Freshman Orientation.
Specific questions may be addressed to the College Center for Academic Support, 312 Lattimore Hall, P.O. Box 270402, Rochester, NY 14627. Phone: (585) 275-2354.

TRANSFER ADMISSION
The University of Rochester encourages students who have successfully begun their academic careers at other colleges or universities to continue their educations here on either a full-time or part-time basis. Ordinarily, students who have previously enrolled for at least one semester of full-time study or who have completed a minimum of 6 credit hours at another college after graduation from high school are eligible to apply for transfer admission. Students undertaking college-level coursework as part of their high school programs, or in order to satisfy high school diploma requirements, are eligible to enter as freshmen, although they are welcome to request academic credit for their college work.

Application Procedure
Transfer students may apply for admission to either the fall or spring semester. Application review for the fall semester begins in February; for the spring semester, in October. Students are then notified on a rolling basis as the applications become complete. The recommended deadline for fall consideration is June 15, and for spring, October 1. It is to the student’s advantage to complete an application well in advance of the semester for which he or she is applying. This is especially true if the student is requesting financial aid and/or on-campus housing.

The School of Nursing does not accept undergraduate transfer students. Students must have a prior associate’s degree in nursing OR a prior non-nursing baccalaureate.

Application Materials
In addition to the transfer application form, transfer applicants should submit official transcripts from each college previously attended; a recommendation from the last college attended on a full-time basis; a high school transcript (or equivalent) and recommendation; SAT or ACT scores; and a catalog or bulletin from each college so all previous coursework can be evaluated for transfer credit.

International students living outside the United States are required to submit the same documents (officially translated, if the originals are not in English) and to take the same tests as students living in the United States in order to complete their applications. In addition, applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL) or the English Language Proficiency Test (ELPT).

Academic Review
Emphasis is placed on the most recent coursework completed at the college level. Applications from candidates who could enter with more than four semesters of transfer credit are generally reviewed by the department in which a major is planned. After reviewing an application, the Committee on Admissions notifies the candidate of its decision soon after the application is completed.

Transfer Credit
Courses taken at another college are evaluated individually for transfer credit and placement. Courses which are judged comparable in level and content to coursework offered at Rochester, and completed with grades of C or better, will transfer for curriculum requirements or for elective credit. When a transfer student applies for a major, the department will designate which transferable courses may be applied toward its requirements.

Residency Requirement
The College requires that students complete a minimum of four semesters of full-time study in residence or, for part-time students, the equivalent number of credit hours to be eligible for the bachelor’s degree. Coursework taken at the University prior to admission as a matriculated student does not count toward the residency requirement.

Transfer students are expected to fulfill all requirements set by the College. The School of Nursing programs for R.N.s require a minimum of 32 nursing credits taken at the University of Rochester. The School of Nursing Accelerated Programs for Non-Nurses require a minimum of 49 nursing credits. These nursing credits may be taken on a full- or part-time basis.

Housing
Transfer applicants customarily receive a housing assignment from the Office of Residential Life if their deposit and the University housing contract are received by the specified date each year. Students in need of housing whose application process is completed after all available space has been allocated will be offered assistance in securing alternative housing.

Campus Visits
Students who are considering transfer are urged to visit the campus to become familiar with the University community and to obtain answers to their questions about Rochester. Requests for application materials and campus visits should be directed to the Office of Transfer Admissions, University of Rochester, P.O. Box 270251, Rochester, NY 14627-0251, telephone (585) 275-3221 or (888) 822-2256. Students who bring copies of their transcripts may obtain an advisory opinion of their probable transfer credits and class standing.

Financial Aid
Transfer students in need of financial assistance should file the College Scholarship Service’s (CSS) PROFILE Application and the Free Application for Federal Student Aid (FAFSA). It is recommended that students requesting financial assistance complete the application early. For additional information see the section on financial aid on page 186.

Transfer applicants should note the University does reserve merit funds for transfer students, including Transfer Rush Rhees Scholarships, Transfer Meliora Grants, and Phi Theta Kappa Scholarships. For more information about these grants and merit-based awards, applicants should contact the Office of Transfer Admissions at (585) 275-3221.

READMISSION
Students who withdraw from the College or are separated for any reason and who wish to re-enter should apply through the College Center for Academic Support. Applications for readmission are reviewed by the dean and other representatives of the College. Students who appear ready to resume their programs are generally approved for readmission, subject to space limitations in departments and residence halls. Applications for readmission should be filed one to two months before the beginning of the term in which the student plans to re-enter. Readmission to the School of Nursing is handled through the Office of Student Affairs, (585) 275-2375.

PART-TIME STUDENTS AND SPECIAL STUDENTS
Part-time nonmatriculated (non-degree) students have an opportunity to try out various programs of study or just enjoy a class for personal enrichment. However, subsequent matriculation as a regular student, if desired, requires application for transfer admission. For details on registering as a nonmatriculated student, see How to Apply at www.rochester.edu/osp. Matriculated students who wish to change their status from full-time to part-time, or vice versa, need to inform their dean prior to the first day of classes. Tuition will be adjusted for students who change their status after classes begin.

For more information about part-time enrollment please visit the Office of Part-time Studies, 127 Lattimore Hall, www.rochester.edu/osp, or call (585) 275-2344.

Special guidance in planning a program of study in engineering is available from the School of Engineering and Applied Sciences in Lattimore Hall and in nursing from the School of Nursing in Helen Wood Hall. Part-time students are encouraged to write or call for appointments.

The category special student includes those full-time students who want to pursue coursework not leading to a degree, those who wish to complete professional school prerequisites, and “visiting” students currently enrolled in another college who wish to attend the University for only a term or a year. Preprofessional advising is available to special students planning to complete requirements at the University for admission to medical or dental school, law school, or other graduate and health professions programs (refer to Career and Counseling Services). Prospective special students are welcome to direct their inquiries to the Office of Transfer Admissions at (585) 275-3221.
Expenses to be anticipated in determining the cost of an education at Rochester can best be understood as a combination of fixed and variable expenses. Fixed costs are those payable directly to the University for tuition, fees, and room and board for those living on campus and participating in a University board plan. Those costs and information relevant to their payment are summarized below.

Variable expenses are those which an individual student incurs over and above these fixed costs. The largest components of variable expense are likely to be books and transportation. Amounts spent for clothing, recreation, and personal items will differ widely according to the financial circumstances and personal spending patterns of individuals.

On the basis of past experience and for purposes of assessing the need for financial aid, the Financial Aid Office can estimate the average cost to an undergraduate for one year. Generally referred to as the estimated cost of attendance, this figure for students living on campus during the 2007–2008 academic year is $48,150. Commuting students who live with their parents in the greater Rochester area may estimate an annual budget of $42,420.

### Fixed Costs

Tuition for full-time undergraduates in the College is $34,380 for the 2007–2008 academic year. (Please note that tuition and fees for the Eastman School of Music and the School of Nursing will vary.) A room in a campus residence, double occupancy, is $6,180 per year. The most comprehensive board plan is $4,798 per year. Freshmen incur a one-time charge of about $200 for meals and accommodations during orientation.

A mandatory health fee of $576 per year is charged to all full-time students.

All students pay an activity fee, which is established annually by the student government. The fee is $232 for the academic year. In addition, all resident students pay a social fee of $10 for the academic year.


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*Other plans available. Engineering juniors and seniors pay an engineering equipment fee of $675 per year.

NOTE: For adjustment of charges in case of withdrawal, see page 173, Adjustment Charges, Withdrawal, and Inactive Status.

NOTE: Noncredit course fees: All persons attending noncredit courses must pay fees as announced for these courses.

In addition to fixed costs, undergraduates should expect to pay an average of $860 for books, $1,130 for personal expenses, plus their travel costs.

### Payment Options

Undergraduate students are billed on the basis of charges for each semester. The University offers three options for payment of tuition and fees. (1) A Monthly Payment Option consists of four monthly payments for each semester. An administrative fee is charged when this plan is chosen. (2) A Semester Payment Option consists of one payment for each semester. (3) An International Payment Option for students with an international billing address consists of one payment for each semester. Students are billed two months in advance of the due date and payment must be in US dollars and drawn on a U.S. bank.

Billing statements are sent in the student’s name, to the address indicated on the Payment Agreement. The agreement is applicable only to tuition and required fees, which are included in the Enrolling Student Packet. All students are required to sign a payment agreement. All other charges will be due in full by the due date indicated on the statement. If full payment is not received by the due date, the University will assess a late payment fee of 1 percent of the amount past due. Students who have not returned a Payment Agreement will be unable to register for class until the Agreement is submitted and will be expected to pay the full amount due before the next due date. Arrangements to have funds available for payment should therefore be made in advance of each due date. Postdated checks submitted cannot be held for deposit. Students who are delinquent in their payments are not allowed to register for the next semester, receive transcripts, participate in the housing lottery, or receive their diplomas. Students with delinquent balances at the end of a semester may be withdrawn from the University. All prior academic year balances must be paid in full before the start of the next academic year. Students whose past due balance is $5,000 or greater, or who submit a check that is returned by the bank, are subject to cancellation of registration for the current semester and withdrawal from the University unless acceptable arrangements are promptly made.

Financial aid awards to be received by students will be used as anticipated credits against charges assessed, following receipt of all proper documentation. Questions concerning financial aid awards, what documentation must be submitted to the University, etc., should be directed to the Financial Aid Office.

A Prepaid Tuition Plan is available that enables incoming first-year students to prepay four years of tuition at the rate in effect during the year of initial enrollment. Enrolled students may join the plan at the beginning of the fall semester, as long as four or more semesters remain in their undergraduate program. The tuition rate charged will be the rate in effect at the time they join the plan. More information
Students must submit application materials to the Office of Admissions by April 15. Documentation by April 15 should be available online at www.fafsa.ed.gov as soon as possible. In addition, students must submit the Free Application for Federal Student Aid (FAFSA) online at www.fafsa.ed.gov as soon as possible after January 1. The University of Rochester school code is 002894. In addition, copies of parent and student federal tax returns may be requested. All applicants who are not U.S. citizens or permanent residents should file the International Student Financial Aid Application, available through the Office of Admissions.

FINANCIAL AID
The Financial Aid Office is here to help students and their families afford the investment of a Rochester education through a combination of different aid programs. Applying for Financial Aid
Incoming students must complete the CSS PROFILE online at www.collegeboard.com. The University of Rochester school code is 2928, and our priority deadline is February 1 for regular decision applicants (November 15 for early decision applicants). Students must meet these priority deadlines to ensure full consideration for need-based assistance. If a student’s parents are divorced, separated, or never married, the non-custodial parent must also complete the Non-Custodial Parent PROFILE.

In addition, students must submit the Free Application for Federal Student Aid (FAFSA) online at www.fafsa.ed.gov as soon as possible. In addition, copies of parent and student federal tax returns may be requested. All applicants who are not U.S. citizens or permanent residents should file the International Student Financial Aid Application, available through the Office of Admissions.

Renewing Financial Aid
Students receiving need-based financial aid must file the FAFSA each year. Additional application materials are also required, and students are notified prior to the start of the spring semester each year so that they may complete the application process by April 15. Returning students who do not submit their financial aid application with all supporting documentation by April 15 should be aware that they are not guaranteed full consideration for need-based assistance and may have their aid reduced due to limited funding.

Estimated Family Contribution
The family contribution is based on an analysis of the financial aid application materials provided by each student that takes into consideration income, assets, family size, number of siblings in college, and other variables. As these variables often change from year to year, students must submit application materials each spring to assess the family contribution for the coming academic year.

Types of Financial Assistance

General Awarding Guidelines
Students receiving merit- or need-based University scholarships/grants should be aware that certain restrictions apply:
- Entering freshmen are limited to eight semesters of scholarship/grant assistance, transfer students are eligible for assistance until the graduate date determined at the time of admission.
- University scholarships/grants require full-time enrollment (at least 12 credits per semester).
- Students must meet Satisfactory Academic Progress requirements.
- University scholarships/grants are not available for summer coursework.

Types of Financial Assistance

Merit-Based Scholarships
Merit-based scholarship recipients demonstrate outstanding academic achievement, talent, leadership, and potential. The Admissions Office carefully considers a student’s application for admission when making these decisions. The Admissions section provides additional information on these awards. Merit-based scholarships will be included in the calculation of need-based aid.

Need-Based Financial Aid Programs
Demonstrated need is calculated by subtracting a family’s estimated contribution from the cost of attendance. The Financial Aid Office uses demonstrated need to determine eligibility for scholarships, grants, loans, and work opportunities. While every student’s financial aid package is different, the following are some of the most common financial aid programs. Amounts will vary based on each individual student’s demonstrated need. Aid cannot disburse to the student account until 10 days prior to the beginning of classes each term.

Grants

Rochester National Grant. The University of Rochester commits significant resources to need-based grant funding.

Endowed Scholarships. The Rochester National Grant program is also funded through hundreds of need-based endowed scholarships, which assist the University in maintaining its commitment to meet the full demonstrated need of each incoming student.

Federal Pell Grant. The Pell Grant is a federal program designed to provide low interest loans to assist students whose families demonstrate the highest need.

Subsidized Federal Direct Loan. The Direct Loan Program is a federal program designed to provide students demonstrating financial need with a low-interest loan to help cover the cost of education. Maximum annual eligibility is determined by a student’s class year standing.

Institutional Employment. Campus employment is not limited to the FWS Program. Many students without FWS eligibility work in dozens of different departments on campus.

National Science and Mathematics Access to Retain Talent (National SMART) Grant. The National SMART Grant is a federal program providing assistance to third- and fourth-year students demonstrating the highest need. Eligible students must be U.S. citizens, have declared an eligible major, and maintain a minimum 3.0 cumulative GPA.

Federal Supplemental Educational Opportunity Grant (FSEOG). FSEOG is a joint program between the federal government and the University to provide additional funding to those students whose families demonstrate the highest need.

New York State Tuition Aid Program (TAP). TAP is a New York State grant program based on a family’s New York taxable income and the student’s level of study. In addition to the FAFSA, a separate TAP application is required by the state. If the application is not completed, any estimated TAP award in the financial aid package will be lost. The University of Rochester TAP filing code is 1015.

State Grants. Certain states outside New York will allow their grant programs to be used at schools in New York. Contact your state agency for more information.

Loans

Federal Perkins Loan. The Perkins Loan Program is a joint program between the federal government and the University designed to provide low interest loans to assist students whose families demonstrate the highest need.

Subsidized Federal Direct Loan. The Direct Loan Program is a federal program designed to provide students demonstrating financial need with a low-interest loan to help cover the cost of education. Maximum annual eligibility is determined by a student’s class year standing.

Work Opportunities

Federal Work-Study Program (FWS). The FWS Program is a joint program between the federal government and the University designed to provide opportunities for students to work during the school year to earn money to help cover their educational expenses. Opportunities are available across campus as well as the surrounding community. Students are paid an hourly wage for work performed. There is a special emphasis on community service opportunities. See Career Center (page 172) for more information on these offerings.

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Institutional Employment. Campus employment is not limited to the FWS Program. Many students without FWS eligibility work in dozens of different departments on campus.
In addition to the merit- and need-based programs offered through the University, there are many other financial resources students and families may wish to pursue. For example, the strength of the candidates who apply to the University often makes our applicants excellent candidates for outside scholarships. Family employers, local foundations, clubs, and community agencies are excellent sources for scholarship opportunities. In addition, students should take advantage of resources such as their guidance office, local library, and the Internet. The Financial Aid Office’s Web site includes links to multiple resources: http://enrollment.rochester.edu/financial/.

Many families are also interested in financing a portion of the cost of education through long-term financing options. Additional information regarding these options, as well as alternative loan options, is available in the Financial Aid Office. Common programs include the following:

**Unsubsidized Federal Direct Loan.** The Direct Loan Program also offers an unsubsidized version for students whose financial need is met through other resources. The interest on this low interest educational loan accrues while the student is in school.

**Federal Direct Parent Loan for Undergraduate Students (PLUS).** The PLUS Program allows parents to borrow up to the cost of education minus any other financial aid offered.

**School of Nursing Grants.** For this and any other nursing grants, please contact the School of Nursing directly at (585) 275-2375.

**Federal Nursing Loans.** Loans from this federal program are authorized by the Financial Aid Office. Repayment begins nine months after completion of studies. Similar to Federal Perkins Loans, specified deferment provisions are available. Eligibility is restricted to U.S. citizens or permanent residents.

For financial aid assistance for the School of Nursing, please see www.son.rochester.edu/son/prospective-students/finances/financial-aid.

**Part-Time Employment**

Students may receive Federal Work-Study as part of their total aid award. Earnings through Federal Work-Study are paid directly to the student at a rate dependent on the specific job held. Ordinarily 10 to 15 hours per week is a suggested work load for students who seek to earn the amount awarded. Opportunities are also available to students without Federal Work-Study funding who wish to work on campus. The Career Center is the centralized site for on-campus information regarding postings. See the section on Career and Counseling Services for more information on these offerings.
Students are expected to abide by the rules of the University and its faculties and to conduct themselves in accordance with accepted standards of good citizenship, honesty, and propriety, and with proper regard for the rights of others. When the University delegates judicial and disciplinary responsibilities to faculty, staff, or student groups, students must abide by their decisions. Of course, students must obey federal, state, and local laws as would any other citizens.

Disciplinary sanctions up to and including expulsion may be imposed upon members of the University community for certain infractions, including by way of example the following:

1. Academic cheating or plagiarism, furnishing false information to the University or to members of the University community, forgery, alteration or misuse of University documents, records, or identification cards, or violation of fire safety regulations; and
2. Acts which are illegal under the law, including, but not limited to, theft; disorderly conduct; computer crime; manufacture, sale, possession, or distribution of illegal drugs, including alcohol; rape; possession or use of firearms or explosive materials; assault or battery; vandalism; reckless endangerment of other persons; unauthorized possession of master keys; and failure to comply with reasonable requests of University officials in performance of their duties.

The above is not an exhaustive list or description of the precise conduct that may lead to discipline, but is intended to be illustrative. Specific policies, rules, and regulations concerning academic and non-academic conduct, and the procedures for addressing violations are available from the deans' offices of the College, the Eastman School of Music, and the School of Nursing.

**INVENTORY OF REGISTERED PROGRAMS**

The New York State Education Department has authorized the University of Rochester to offer the undergraduate-level programs which appear in the following inventory. A listing of graduate programs offered at the University may be found in the **Official Bulletin: Graduate Studies**. Programs offered at the Eastman School of Music may be found in the **Official Bulletin: Eastman School of Music**.

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**UNIVERSITY RECORDS**

The University policy on student records is available to students and their parents through the Office of the University Registrar.

**Reports to Parents**

It is the policy of the University to consider all matriculated undergraduate students dependent until the age of 21 unless they formally declare their independence, either at the time of enrollment or subsequently through application to the dean’s office of their college.

Unless otherwise directed, reports concerning dependent students will be sent to the parent(s) or guardian(s) at the address designated on the registration materials at the time of enrollment.

If divorced or separated parents wish to receive individual mailings, the student should so advise the registrar’s office (College and School of Nursing students, Office of the University Registrar; Eastman School students, the Eastman School Registrar).

Notification of a change of address, or of a change in the designation of the parent who is to receive University mailings, should be made by the student to the appropriate registrar’s office.

**DESCRIPTION OF POLICIES AND RULES**

A list of publications that fully describe all policies and rules pertaining to University programs is contained in the course schedule published before the start of each term and on the University’s Web site. These publications include, for example, an undergraduate course description handbook, the *Official Bulletin: Graduate Studies*, the *UR Here* handbook and the College Dean of Students’ pamphlet entitled *Student Discipline: Conduct Standards, Policies, and Procedures*, for undergraduates. Policies and rules for nursing students are listed in the student handbook.

**STUDENT COMPLAINT PROCEDURE**

Both informal and formal procedures exist to resolve student complaints involving harassment, discrimination, and other issues. Information about such procedures can be obtained from the deans’ offices of the College, the Eastman School of Music, and the School of Nursing; from the University Intercessors; or by contacting the University’s Equal Opportunity Coordinator at 24 Wallis Hall, phone 275-9125. More information about complaints can be found in the *UR Here* handbook and the *Official Bulletin: Graduate Studies*.
University Buildings

Key
1. Rush Rhees Library*
   Departments of History, Religion and Classics, and Film and Media Studies; College Writing Program; Multidisciplinary Language Lab; Computer Sales; principal library for the River Campus.
2. Morey Hall*
   Eastman Kodak Colonnade
3. Lattimore Hall*
4. Strong Auditorium*
5. Schlegel Hall*
6. James S. Gleason Hall*
7. Dewey Hall*
8. Carol G. Simon Hall*
9. Hoyt Hall*
10. Bausch & Lomb Hall*
11. Meliora Hall*
12. Harkness Hall*
13. Gavett Hall*
14. Taylor Hall*
15. Hopeman Engineering Bldg.*
16. N.Y. State Center for Advanced Technology
17. Wilmot Bldg.*
18. Robert B. Goergen Hall for Biomedical Engineering and Optics*
19. Computer Studies Bldg.*
   Carlson Science and Engineering Library
20. Hylan Bldg.*
21. Hutchison Hall*
   Hubbell Auditorium
   Lander Auditorium
22. Wallis Hall*
   Admissions Office
   University Administration Offices
23. Interfaith Chapel*
24. Todl Union*
25. Delta Kappa Epsilon
26. Alpha Delta Phi
27. Theta Chi
28. Psi Upsilon
29. Quad Annex
30. Sigma Alpha Mu
31. Sigma Chi
32. Medieval House
33. Drama House
34. Burton Hall
35. Lovejoy Hall
36. Tierman Hall
37. Gilbert Hall
38. Hoeing Hall
39. Crosby Hall
40. Wilson Commons*
41. Frederick Douglass Bldg.*
   Bookstore
   Dining Center
   The Meliora
42. Robert B. Goergen Athletic Center*
   Alexander Palestra
   Edmund A. Hajim Alumni Gymnasium
   Field House
   Pool and courts
   Squash and Racquetball Center
43. Fauver Stadium*
44–48. Susan B. Anthony Halls*
44. Gates Hall
45. Morgan Hall
46. Hollister Hall
47. Danforth Dining Center
48. Gannett Hall
49. Spurrier Hall*
50. Sage Art Center*
51–52. Founders Court
51. Anderson Tower
52. Wilder Tower
53. Facilities and Services Bldg.
54–59. Hill Court
54. Fairchild House
55. Gale House
56. Slater House
57. Munro House
58. Kendrick House
59. Chambers House
60–65. Mt. Hope Campus
60. 575 Mt. Hope Ave.
61. 590 Mt. Hope Ave.
62. 630 Mt. Hope Ave.
   (Peter Barry House)
63. 668 Mt. Hope Ave.
   (Ellwanger & Barry Bldg.)
64. 692 Mt. Hope Ave.
   (Patrick Barry House)
65. 685 Mt. Hope Ave.
66. Towne House*
67. Data Center Services (DCS)
68. Mt. Hope Professional Bldg.
69. Mail Services Bldg.
70. Goler House*
71. Eastman Dental Center*
72. Parking Garage
73. Ambulatory Care Facility
74. Hospital Lobby
75. Strong Memorial Hospital*
76. Frank and Caroline Gannett Emergency Center
77. Supplies & Accounts Bldg.
78. James P Wilmot Cancer Center
79. University Health Service
80. School of Medicine and Dentistry*
81. Medical Center Annex
82. Central Utilities Plant
83. Arthur Kornberg Medical Research Building*
84. Medical Research Building Extension*
85. Helen Wood Hall*
86. KinderCare Learning Center
87. University Park*
88. Graduate Maisonneutes*
89. de Kiewiet Tower*
90. Valentine Tower*
91. Administrative Annex
92. Center for Optoelectronics and Imaging
93. Robert L. Sproull Center for Ultra High Intensity Laser Research
94. Laboratory for Laser Energetics
95–96. Advancement and Alumni Center
97. Whipple Park Apartments*

*Description on pages 192–193.
Assistance Services; Orientation Office; Departments of Anthropology, Linguistics, Modern Languages and Cultures, and Philosophy; Susan B. Anthony Institute for Gender and Women’s Studies; American Sign Language Lab; a 153-seat auditorium; classroom and seminar rooms.

4. Strong Auditorium: Two halls, seating 1,000 and 400 persons, used for lectures, films, stage productions, and concerts.


7 and 8. Dewey Hall and Carol G. Simon Hall: Margaret Warner Graduate School of Education and Human Development administrative and faculty offices; William E. Simon Graduate School of Business Administration administrative and faculty offices; Counseling & Mental Health Services; teaching laboratories of The Institute of Optics.

9. Hoyt Hall: 300-seat auditorium for lectures, meetings, films, and conferences.


11. Meliora Hall: Office of the Bursar; Office of Student Financial Assistance; College Career Center; Departments of Brain and Cognitive Sciences and Clinical and Social Psychology; Center for Visual Science; River Campus Copy Center; administrative offices; and general classroom facilities.


13. Gavett Hall: Offices, classrooms, and laboratories of the Department of Chemical Engineering; laboratories of the Department of Mechanical Engineering and of The Institute of Optics.

14. Taylor Hall: Center for Electronic Imaging Systems; College Facilities Machine Shop.

15. Hopeman Engineering Bldg.: Offices, classrooms, and laboratories of the Departments of Electrical and Computer Engineering; Mechanical Engineering, Biomedical Engineering.

16. Wilmot Bldg.: Offices, seminar rooms, and laboratory facilities for The Institute of Optics.

17. Robert B. Goergen Hall for Biomedical Engineering and Optics: A 100,000-square-foot building that houses the Department of Biomedical Engineering, including student and faculty laboratories, auditorium, and classrooms. Also houses faculty offices and research laboratories for the Institute of Optics.

18. Computer Studies Bldg.: Offices, classrooms, and laboratories of the Departments of Computer Science and Electrical and Computer Engineering; Carlson Library.

19. Hylan Bldg.: Offices of the Department of Mathematics; Office of Research and Project Administration; Office of Technology Transfer; classrooms, conference rooms, commons rooms, and seminar rooms.

20. Hutchison Hall: Classrooms, lecture halls, laboratories, offices, and commons rooms of the Undergraduate Program in Biology and Medicine; Departments of Biology, Chemistry, and Earth and Environmental Sciences; a greenhouse complex.

21. Hubbell Auditorium: 483-seat auditorium in Hutchison Hall for lectures, special meetings, and conferences.


23. Interfaith Chapel: Center for campus religious activities and chaplains’ offices.

24. Todd Union: Noteworthy as one of the first student unions in the United States, essentially replaced by Wilson Commons. Houses the offices of the River Campus Music Department, the Campus Postal Unit, a bank, Todd Theater, and two student radio clubs, WRUR-AM and FM and K2ZWI (Amateur Radio).

25. Wilson Commons: The campus center with student organization offices, a recreation center, lounges, meeting and performing facilities, dining services; Office of the Dean of Students; the Common Ground coffeehouse; Hirst Lounge; William H. Stackel Meeting Room; Hartnett Art Gallery; Arthur J. May Multi-Purpose Room; Samuel M. Havens Lounge; Fred Gowen Room; Ruth Merrill Student Organization Center; George Graham Smith Plaza.

26. Frederick Douglass Bldg.: A student dining center; meeting rooms; University Bookstore; The Meliora (formal/informal dining).

27. Goergen Athletic Center: An 11,000-square-foot fitness center, locker rooms, a multi-activity center, a central issue room for equipment, and all departmental offices; the Palestra is home to Yellowjackets basketball and volleyball in addition to serving as a venue for University concerts and special events; field house includes an indoor 200-meter running track and synthetic activity infield; aquatic center includes a 25-yard by 25-meter pool and a separate diving well with one- and three-meter diving boards; also houses an athletic training facility; four indoor tennis courts, five international squash courts, two racquetball/handball courts, an aerobics studio, and three combination basketball/volleyball courts.

28. Fauver Stadium: 5,000-seat stadium with a lighted, artificial-turf playing surface surrounded by an eight-lane, 400-meter running track. Site of intercollegiate field hockey, lacrosse, football, soccer, track and field. Planning and Project Management and the Office of the University Architect are located on the second floor. The Parking Office is at the south end of the stadium.

29. Spurr Hall: Dance studio and music practice rooms.

30. Sage Art Center: Teaching and studio facilities for visual arts programs.

31. Towne House: East Wing—Human Resources; Clinical Practice Evaluation; Security; Planning and Project Management; University Audit. Center—Graduate Housing; Psychology Clinical Trials Coordination Center; Counseling & Mental Health Services; Finance. West Wing—University Computing & Systems Center; Telecommunications.

32. 70, 87, 88, 89, 90, 97. University Apartments: George Washington Goler House; University Park, Graduate Maisonettes, de Kiewiet Tower, Valentine Tower; Whipple Park.

33. 71, 75, 80, 85. University Medical Center: Eastman Dental Center; Strong Memorial Hospital; School of Medicine and Dentistry; School of Nursing.

34. 83. Arthur Kornberg Medical Research Bldg: Laboratories and offices for the Aab Institute of Biomedical Sciences.

35. Medical Research Building Extension: Laboratories and offices for the School of Medicine and Dentistry.

36. Helen Wood Hall: School of Nursing; Program for Pediatrics; Departments of Community and Preventive Medicine and Family Medicine; classrooms.
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<tr>
<th>Abbreviation</th>
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<td>Applied Economics</td>
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<td>Art History</td>
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<td>Anthropology</td>
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<td>American Sign Language</td>
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<td>AST</td>
<td>Astronomy</td>
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<td>BCH</td>
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<td>BPP</td>
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ADMINISTRATION

Joel Seligman
President & Chief Executive Officer

Bradford C. Berk
Senior Vice President for Health Sciences
and Chief Executive Officer, University of Rochester Medical Center & Strong Health

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Vice President & General Secretary;
Senior Advisor to the President

Lynne J. Davidson
Deputy to the President & Vice Provost for
Faculty Development & Diversity

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President & CEO, Strong Memorial Hospital &
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Strong Health

Sue S. Stewart
Senior Vice President & University Counsel

James D. Thompson
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Officer

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and Applied Sciences)
Dean of Admissions
University of Rochester
P.O. Box 270251
Rochester, New York 14627-0251
(585) 275-3221 or (888) 822-2256
admit@admissions.rochester.edu
www.enrollment.rochester.edu/admissions

Eastman School of Music
Undergraduate and
Graduate Studies
Director of Admissions
Eastman School of Music
26 Gibbs Street
Rochester, New York 14604
(585) 274-1060
admissions@esm.rochester.edu
www.esm.rochester.edu/apply

Summer Sessions
Office of Community Music School and
Summer Sessions
Eastman School of Music
26 Gibbs Street
Rochester, New York 14604
(585) 274-1400
summer@esm.rochester.edu

School of Medicine and Dentistry
Office of Admissions
University of Rochester
School of Medicine and Dentistry
Box 601-A
Rochester, New York 14642-8601
(585) 275-4539
admish@urmc.rochester.edu
www.urmc.rochester.edu/smd

School of Nursing
Office of Student Affairs
University of Rochester
School of Nursing
601 Elmwood Avenue, Box SON
Rochester, New York 14642
(585) 275-2375
SON_Admissions@urmc.rochester.edu
www.son.rochester.edu/son/home

William E. Simon Graduate School
of Business Administration
Gregory V MacDonald
Executive Director of M.B.A. Admissions
and Administration
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of Business Administration
University of Rochester
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P.O. Box 270107
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(585) 275-3533
admissions@simon.rochester.edu

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of Education and Human Development
Director of Admissions
Margaret Warner Graduate School of
Education and Human Development
University of Rochester
Dewey Hall
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Rochester, New York 14627-0425
(585) 275-3950
admissions@warner.rochester.edu
www.rochester.edu/warner

Graduate Studies
Office of the University Dean of Graduate
Studies
University of Rochester
P.O. Box 270015
Rochester, New York 14627-0015
(585) 275-4279
www.rochester.edu/gradbulletin

Part-time Studies
The College
Director, Office of Special Programs
University of Rochester
127 Lattimore Hall
P.O. Box 270558
Rochester, New York 14627-0358
(585) 275-2344

Sue S. Stewart
Senior Vice President & University Counsel

James D. Thompson
Senior Vice President & Chief Advancement
Officer